Casualty Actuarial Society

2004
Syllabus of Examinations

For details about where to send registrations, orders, and payments, please see pages 6 and 7.

Notice to Candidates

1. New Format—New Learning Objectives

The CAS has been working with an education consultant to improve the education and examination process. A specific recommendation was to clarify and publish learning objectives for each exam. The learning objectives state what the successful candidate should be able to do in actual practice. Readings are linked to specific learning objectives to help candidates identify the purpose of the reading. The Examination Committee will focus exam questions on the learning objectives and draw from related material in the syllabus readings.

The *Syllabus of Examinations* has been reformatted to accommodate the inclusion of learning objectives with their corresponding knowledge statements. A complete explanation is available under "Materials for Study" on page 29.

2. Web Name Change for 2004

The "Exams" section of the CAS Web Site has been renamed the "Admissions" section.

3. Online Registration for Exams 3, 5-9

Candidates may submit examination registrations online for Exams 3, 5-9. Before completing an online application, candidates must submit an Electronic Signature Authorization Form (ESAF), available in the "Admissions" section of the CAS Web Site. Candidates intending to register online should submit their ESAFs by the end of February for Spring Exams and the end of August for Fall Exams. Important details are available on page 7.

4. Supplemental Exam Materials

Exams 3, 4, 5, and 9 will have supplemental material distributed with the exam package. Details are provided with the individual citations under the Complete Text References at the end of each exam section. If the Examination Committee decides to provide supplemental materials with any other examination, a notice will be posted in the "Admissions" section of the CAS Web Site.

5. *Notice of Examinations* Posted in January and July

The CAS posts the *Notice of Examinations* for Spring Exams in January and the Fall Exams in July in the "Admissions" section of the CAS Web Site. The *Notice* contains important information for the exams as well as information on study aids and review seminars.

6. Only One Deadline—No Late Registrations will be Accepted

There is only one registration deadline for each exam session. No late registrations will be accepted. The deadlines are:

Spring 2004	Registration Deadline
Exams 1, 2, 4	April 1, 2004
Exams 3, 5, 7, 8	March 25, 2004

Fall 2004	Registration Deadline
Exams 1, 2, 4	September 24, 2004
Exams 3, 6, 9	September 16, 2004

The Spring 2004 CAS Examinations will be held in May; the Fall 2004 CAS Examinations will be held in late October and November. Exact dates are listed on page 5.

7. Materials for Study

Please refer to the appropriate examination section for the learning objectives, knowledge statements, and lists of readings. Any changes made after the publication of this *Syllabus* will be posted under "*Syllabus* Update" in the "Admissions" section of the CAS Web Site at www.casact.org.

8. Calculators

Only approved calculators may be used for CAS Examinations. Details are provided on pp. 11-12.

9. Obtaining Examination Booklet (Exams 3, 5-9)

For Exams 3, 5-9, a candidate wishing to obtain his or her own examination booklet and scrap paper subsequent to the examination should bring a self-addressed stamped envelope to the examination center. The recommended minimum postage is $2.67 for domestic mail in the U.S.

10. Order CAS Publications at CAS Online Store

All CAS publications that are available for purchase, including Study Kits and Web Notes, are available at the CAS Online Store (www.casact.org). The *Syllabus* only provides order information for the study materials.

11. CAS Web Site (www.casact.org)

The *Syllabus of Examinations*, *Syllabus* Update, *Notice of Examinations*, List of Passing Candidate Numbers, List of Passing Candidate Names with New Fellows and Associates, *Future Fellows* newsletter, and other important information will be posted in the "Admissions" section of the CAS Web Site.

Foreword

Actuarial science originated in England in 1792 in the early days of life insurance. Because of the technical nature of the business, the first actuaries were mathematicians. Eventually, their numerical growth resulted in the formation of the Institute of Actuaries in England in 1848. Eight years later, in Scotland, the Faculty of Actuaries was formed. In the United States, the Actuarial Society of America was formed in 1889 and the American Institute of Actuaries in 1909. These two American organizations merged in 1949 to become the Society of Actuaries.

In the early years of the 20th century in the United States, problems requiring actuarial treatment were emerging in sickness, disability, and casualty insurance—particularly in workers compensation, which was introduced in 1911. The differences between the new problems and those of traditional life insurance led to the organization of the Casualty Actuarial and Statistical Society of America in 1914. Dr. I.M. Rubinow, who was responsible for the Society's formation, became its first president. At the time of its formation, the Casualty Actuarial and Statistical Society of America had 97 charter members of the grade of Fellow. The Society adopted its present name, the Casualty Actuarial Society, on May 14, 1921.

The purposes of the Society are to advance the body of knowledge of actuarial science applied to property, casualty, and similar risk exposures, to establish and maintain standards of qualification for membership, to promote and maintain high standards of conduct and competence for the members, and to increase the awareness of actuarial science. The Society's activities in support of this purpose include communication with those affected by insurance, presentation and discussion of papers, attendance at seminars and workshops, collection of a library, research, and other means.

Since the problems of workers compensation were the most urgent at the time of the Society's formation, many of the Society's original members played a leading part in developing the scientific basis for that line of insurance. From the beginning, however, the Society has grown constantly, not only in membership, but also in range of interest and in scientific and related contributions to all lines of insurance other than life, including automobile, liability other than automobile, fire, homeowners, commercial multiple peril, and others. These contributions are found principally in original papers prepared by members of the Society and published annually in the *Proceedings of the Casualty Actuarial Society*. The presidential addresses, also published in the *Proceedings*, have called attention to the most pressing actuarial problems, some of them still unsolved, that have faced the industry over the years.

The membership of the Society includes actuaries employed by insurance companies, industry advisory organizations, national brokers, accounting firms, educational institutions, state insurance departments, and the federal government. It also includes independent consultants. The Society has three classes of members, Fellows, Associates, and Affiliates. Fellows and Associates require successful completion of examinations as described in this *Syllabus*. Affiliates are qualified actuaries who practice in the general insurance field and wish to be active in the CAS but do not meet the qualifications to become a Fellow or Associate.

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Application and Order Forms

All applications and order forms will be available in the "Admissions" section of the CAS Web Site (www.casact.org), including applications and order forms for Exams 1, 2, and 4.

Note: This *Syllabus* is subject to change in the future. The CAS is not responsible for any errors or omissions in the *Syllabus*.

INTRODUCTION

Principles of the Casualty Actuarial Society for Basic Education

The primary purpose of the Casualty Actuarial Society (CAS) basic education process is to ascertain whether candidates for the CAS designations have satisfied CAS learning objectives. The CAS Board of Directors adopted the following principles on May 6, 2001.

1. Basic education will remain a cornerstone of the CAS.

2. The CAS will assure that its members have the knowledge of those areas needed to practice effectively in the broad and expanding range of property, casualty, and similar business and financial risks (general insurance).

3. The CAS is committed to a depth of knowledge of techniques associated with the broad range of property, casualty, and similar business and financial risks.

4. The CAS will provide the basic education necessary to meet qualification standards to sign statements of actuarial opinion for general insurance and related specialties in at least the U.S. and Canada.

5. The education process will provide a balance among theoretical concepts, practical applications, and business acumen, to prepare our members to deliver high-quality service to meet current and projected future needs of employers and clients.

6. The CAS will approve the syllabus and examination standards used in determining eligibility for CAS membership.

7. Demonstration of mastery of the skill sets required of members is critical to basic education.

8. The CAS is committed to maintaining self-study as one route for attainment of designations.

9. The CAS will pursue strong working relationships with academia and professionals in related fields.

10. The CAS will attract a pool of strong candidates from a variety of backgrounds to the actuarial profession.

11. The CAS supports the goal of developing a global shared foundation of actuarial education, including joint sponsorship of examinations where consistent with other principles.

12. The CAS, as an educator of general insurance and related specialties, will remain a significant contributor to the worldwide actuarial profession.

Syllabus Goals and Objectives

One of the primary objectives of the Casualty Actuarial Society (CAS) is the development of qualified professionals in the field of casualty actuarial science. The CAS conducts an educational and examination program for prospective members in order to achieve this objective. The syllabus goals and objectives are as follows:

1. To develop a general understanding of the social, political, regulatory, legal, economic, and financial environment of the business of property and casualty insurance and similar risk assessment as well as the historical development of that environment.

2. To develop a thorough understanding of the fundamental mathematical concepts applicable to solving insurance and similar risk assessment problems and to develop a high degree of skill in their applications.

3. To develop a comprehensive understanding of the business of property and casualty insurance, including underwriting, claims, marketing, and finance, as well as how these functions are performed and interrelate.

4. To develop a working knowledge of property and casualty insurance policies and contracts.

5. To develop an expert knowledge of a broad range of techniques to solve problems and to develop the ability to discern the appropriateness of techniques for particular applications based on a knowledge of the underlying assumptions, strengths, and weaknesses.

6. To develop an expert knowledge of a broad range of relevant and standard actuarial practices in order to present a framework for the use of problem-solving techniques.

7. To encourage a sense of inquisitiveness and creativity toward problem solving in order to foster an appreciation of the art in actuarial science.

Note: The items in this *Syllabus* were chosen for their educational value. They are intended to expose the candidate to a wide range of information and to a variety of methods, opinions, and practices in the casualty actuarial field. Inclusion of material in the *Syllabus* does not imply that the CAS endorses the views, methodologies, or techniques therein.

Education and Examination System

The CAS vice president-admissions supervises the CAS education and examination system. The vice president-admissions is supported by the following four admissions committees.

CAS Education Policy Committee

The Education Policy Committee establishes the goals and objectives of the CAS education and examination system to ensure that the needs of the Society, its members, and its potential members are met. The committee also monitors the operations of the other educational and examination committees to ensure continued effectiveness.

CAS Syllabus Committee

The Syllabus Committee determines the scope and content of the CAS *Syllabus* and course of readings for CAS Examinations.

A chairperson supervises the committee that is composed of Fellows who represent a broad spectrum of CAS members including insurers, consultants, regulators, and academicians. At least one representative of the Canadian Institute of Actuaries (CIA) also serves on the committee; usually at least one of the representatives is a member of the CIA Education and Examination Committee. One or more members specialize in the material for each examination part. These specialists recommend changes to the *Syllabus*; however, recommendations must be approved by the entire committee.

The "Materials for Study" are reviewed regularly by members of the Syllabus Committee. Both short- and long-term goals for improvement are developed. Textbooks and articles may be designated for inclusion. If the committee determines that new study material needs to be developed or that existing material needs to be revised, the committee may commission the creation of Study Notes for inclusion. Every effort is made to develop material that is appropriate, relevant, up-to-date, concise, and well-written. Suggestions for improvement are always welcome and should be directed to the Syllabus Committee at the CAS Office address.

CAS Examination Committee

The Examination Committee organizes, manages, administers, and grades the CAS Examinations. The committee also establishes the standards to be achieved by successful candidates.

The chairperson supervises the committee and is responsible for the overall administration of the CAS Examinations. The chairperson is assisted by several senior committee officers with the title of general

officer. The committee is subdivided into Examination Part Committees, each headed by an examination part chairperson.

The committee work is similar for both the jointly administered Exams 1, 2, and 4 and the CAS-specific Exams 3, 5-9. The following provides details about the CAS-specific examinations:

- The responsibility for each CAS Examination is assigned to a part committee that writes, grades, and maintains the standards for that examination. Each part committee is assisted by two examination consultants who are CAS members and are experts on the material covered by that examination. The part committees are also assisted by a proofreader who concentrates on uniformity and grammar. In addition, some part committees are assisted by academic consultants who are independent experts from the academic community.

- Each examination is drafted by the responsible Examination Part Committee to test candidates' knowledge of the items listed in the "Materials for Study." The individual part committee, examination consultants, one of the Examination Committee general officers, the Examination Committee chairperson, and, in some cases, academic consultants review each examination to assure its quality.

- Every effort is made to ensure that the questions fall within the scope of the "Materials for Study." Complete coverage of all material is not practical for every examination every year. The goal is to produce examinations that contain representative, high-quality questions that test candidates' knowledge of the material. Trick questions are deliberately avoided, and the wording of each question is considered carefully to eliminate possible ambiguities. Preliminary versions of each examination are thoroughly reviewed in relation to all of these factors before the final examination is approved.

CAS Candidate Liaison Committee

The Candidate Liaison Committee strives to focus on issues of importance to candidates who are taking CAS Examinations. The committee serves as a direct point of contact for candidates to voice individual or group concerns regarding the education and examination process. It also provides a means for an exchange of information between candidates and the admissions committees via *Future Fellows*, a quarterly newsletter. Candidate representatives who are actively involved in the examination process serve as advisors to the committee.

2004 CAS SYLLABUS SUMMARY

Associateship Examinations

Exam	Subjects
1[*]	Mathematical Foundations of Actuarial Science
2[*]	Interest Theory, Economics, and Finance
3	Actuarial Models
4[*]	Actuarial Modeling
5	Introduction to Property and Casualty Insurance and Ratemaking
6	Reserving, Insurance Accounting Principles, and Reinsurance
7[†]	Nation-Specific: Annual Statement, Taxation, and Regulation

Fellowship Examinations

Exam	Subjects
8	Investments and Financial Analysis
9	Advanced Ratemaking, Rate of Return, and Individual Risk Rating Plans

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[*] Preliminary Actuarial Examinations administers the jointly sponsored Exams 1, 2, and 4 of the Canadian Institute of Actuaries, Casualty Actuarial Society, and the Society of Actuaries.
[†] Candidates must specify their U.S. or Canadian specialty at the time of application.

2004 CAS EXAMINATION SCHEDULE

Spring 2004

EXAM	DATE	ZONE	START TIME	FINISH TIME
1	May 19, 2004*	All time zones	8:30 a.m.	12:30 p.m.
2	May 20, 2004*	All time zones	8:30 a.m.	12:30 p.m.
3‡	May 5, 2004	North and South America	9:30 a.m.	1:30 p.m.
3‡	May 5, 2004	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
4	May 12, 2004*	All time zones	8:30 a.m.	12:30 p.m.
5	May 7, 2004	North and South America	9:30 a.m.	1:30 p.m.
5	May 7, 2004	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
7	May 4, 2004	North and South America	9:30 a.m.	1:30 p.m.
7	May 4, 2004	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
8	May 6, 2004	North and South America	9:30 a.m.	1:30 p.m.
8	May 6, 2004	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.

Fall 2004

EXAM	DATE	ZONE	START TIME	FINISH TIME
1	November 4, 2004*	All time zones	8:30 a.m.	12:30 p.m.
2	November 3, 2004*	All time zones	8:30 a.m.	12:30 p.m.
3‡	October 26, 2004	North and South America	9:30 a.m.	1:30 p.m.
3‡	October 26, 2004	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
4	November 1, 2004*	All time zones	8:30 a.m.	12:30 p.m.
6	October 27, 2004	North and South America	9:30 a.m.	1:30 p.m.
6	October 27, 2004	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
9	October 28, 2004	North and South America	9:30 a.m.	1:30 p.m.
9	October 28, 2004	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.

Starting time for examinations is local time for the specified zone.

*Final information for examinations that are jointly administered by the CAS and SOA may be obtained from the CAS Web Site (www.casact.org), the Casualty Actuarial Society at (703) 276-3100, or the Society of Actuaries at (847) 706-3500.

‡SOA Course 3 will be offered on May 13, 2004, and November 2, 2004.

EXAMINATION RULES

Registration

Administration of Examinations

The CAS education structure has nine examinations and the Course on Professionalism. Exams 1, 2, and 4 are jointly administered by the CAS and the Society of Actuaries (SOA) through Preliminary Actuarial Examinations. Exams 3, 5-9 and the Course on Professionalism are exclusively administered by the CAS. The Canadian Institute of Actuaries (CIA) cosponsors all the examinations.

Filing of Applications

All candidates filing for an examination(s) must submit an application for each examination period (Spring and/or Fall). Application forms are enclosed in this *Syllabus* or may be downloaded from the CAS Web Site (www.casact.org). Payment must accompany each application to be valid. Applications must be received by the following deadlines:

Spring 2004	**Registration Deadline**
Exams 1, 2, 4	April 1, 2004
Exams 3, 5, 7, 8	March 25, 2004

Fall 2004	**Registration Deadline**
Exams 1, 2, 4	September 24, 2004
Exams 3, 6, 9	September 16, 2004

Please allow at least 10 working days for your mailed application to reach its destination. Whether payment is made by personal or company check, **it is the candidate's responsibility to ensure that the application and fee are received by the stated deadline**. Exceptions will not be made. Send applications as follows:

Jointly Administered Exams 1, 2, and 4

Exams 1, 2, and 4 are administered by Preliminary Actuarial Examinations for the CAS, CIA and SOA. Candidates must send an original signed application for the examination session. Unsigned, photocopied, or facsimile applications are not valid. All applications must include an original signature. Fees should be remitted in U.S. funds (or equivalent) by check, money order, or credit card (American Express, MasterCard, or Visa). Please note that payment in Canadian currency may slightly delay the processing of the application.

For the joint exams, the candidate's admission ticket is also a tax receipt and should be retained after the examination as needed for tax purposes. Candidates will not be considered registered for an examination until Preliminary Actuarial Examinations has received an original, signed application for the examination session. Applications are available in the "Admissions" section of the CAS Web Site (www.casact.org).

Send application with check or money order to:

Preliminary Actuarial Examinations
P.O. Box 95600
Chicago, IL 60694-5600

Send application with credit card payment and all overnight deliveries to:

SOA/Preliminary Actuarial Examinations
475 N. Martingale Road, Suite 600
Schaumburg, IL 60173

Applications must be received before the published deadlines.

Exams 3, 5-9

Candidates may submit examination registrations for Exams 3, 5-9 by mail or online. Applications must be received before the published deadlines. Candidates submitting a hard copy of their registration should mail them as follows.

Send application with check or money order in U.S. funds or Canadian equivalent (payable to "Casualty Actuarial Society") to:

Casualty Actuarial Society
P.O. Box 425
Merrifield, VA 22116-0425

Send application with credit card payment (Visa, MasterCard, or American Express) and all overnight deliveries to:

Casualty Actuarial Society
1100 N. Glebe Road, Suite 600
Arlington, VA 22201-4798

Candidates submitting their registrations online for Exams 3, 5-9 must pay by credit card. All credit card payments will be processed in U.S. funds. Prior to completing an online application, candidates must submit an Electronic Signature Authorization Form (ESAF). By signing the ESAF, the candidate agrees to be bound by the rules and regulations related to the examinations. It will also provide a signature of record for comparison to signatures on the individual examination envelopes. The ESAF is available in the "Admissions" section of the CAS Web Site. Unless the candidate has a name change, the ESAF only needs to be submitted once. Candidates should allow three weeks for their ESAF to be processed. Candidates who intend to register online should submit their ESAFs by the end of February for Spring Examinations and the end of August for Fall Examinations.

Candidates will be sent an acknowledgment of receipt of their application within three weeks of the date that the application form was received at the CAS Office beginning February 2 for Spring Examinations and August 2 for Fall Examinations. This acknowledgment is the candidate's receipt of examination fees paid. Please retain this acknowledgment for tax purposes if needed.

Fees

Examination fees must be paid each time a candidate registers for an exam. Payment options are described in the previous section, Filing of Applications. A $20 surcharge will be assessed for all returned checks.

The charts below show the examination fee schedules for Spring 2004 and Fall 2004 at the time of publication. All fees are subject to change. Other fees that may apply include fees for change of center, translation, and/or centers outside the United States or Canada.

Spring 2004 Examination Fees*

	Candidates	Full-Time Students
Exam 1	$95	$95
Exam 2	$140	$140
Exam 3	$365	$290
Exam 4	$365	$290
Exam 5	$525	$420
Exam 7	$525	$420
Exam 8	$525	$420

Fall 2004 Examination Fees*

	Candidates	Full-Time Students
Exam 1	$95	$95
Exam 2	$140	$140
Exam 3	$365	$290
Exam 4	$365	$290
Exam 6	$525	$420
Exam 9	$525	$420

Other Fees*

Refund (Exams 1, 2, and 4)	$50
Refund (Exams 3, 5-9)	$60
Translation Fee (Exams 3, 5-9) *for each exam* (No fee for French.)	$200

Change of Exam Center	$50
Special Exam Center	$50
Exam Center Outside U.S. or Canada (Exams 3, 5-9)	$40

*All amounts are listed in U.S. dollars.

Exam 1 Fee Waiver Program in U.S.

The Joint CAS/SOA Committee on Minority Recruiting sponsors a program to grant Exam 1 fee waivers to members of specified groups that are underrepresented in the actuarial profession in the U.S., including African-Americans, Hispanics, and Native North Americans. An eligible candidate must be either a U.S. citizen or have a permanent resident visa. Exam 1 fee waiver applications are available in the "Minority Programs" section of the actuarial career Web site at www.BeAnActuary.org.

Fee Discount Program in Qualified Countries

The CAS and SOA sponsor a program to provide financial relief to candidates of qualified countries. Eligible candidates must be current residents of a qualified country and verify that they are personally paying for exam fees and study materials without assistance from employers or other entities. Candidates must write their examinations within a qualified country. Application information, including a list of qualified countries, is available in the "Admissions" section of the CAS Web Site at www.casact.org.

Examination Centers

Examination centers are listed at the back of this *Syllabus* immediately prior to the application forms. Centers are determined by the number of candidates near a center and the availability of proctors. Special examination centers may be arranged at the discretion of the CAS or Preliminary Actuarial Examinations if the request is received by the registration deadline. The additional fee for a special center is $50. Candidates will receive the exact location of their examination center at least three weeks before the examination.

Ticket of Admission (Exams 1, 2, and 4 Only)

For Exams 1, 2, and 4, Preliminary Actuarial Examinations will send each candidate: 1) a Ticket of Admission that indicates the examination(s) for which the candidate is registered, and 2) the *Instructions to Candidates*, which covers administrative details about the examination as well as exact examination center locations. Tickets of Admission will be mailed beginning March 1 for the Spring session and September 1 for the Fall session. **This Ticket of Admission must be brought to the examination center** and should be retained after the session is completed. A candidate who has not received a Ticket of Admission two weeks before the examination, or whose ticket contains incorrect information, should contact the Society of Actuaries or the Casualty Actuarial Society. The Ticket of Admission also serves as a receipt and should be retained if needed for tax purposes.

Change of Center

Any registered candidate who requests a change in examination center must pay a change-of-center fee. No requests will be accepted after the registration deadline.

If a request for a change of center occurs, every effort will be made to have the candidate's records and supplies on hand at the appropriate center in time for the examination. If this effort fails, however, the administering organizations are not responsible. If either a candidate's registration and fees, or request for change of center are received so late that it is not feasible to arrange for the candidate to write the examination, the fees will be refunded in full. The administering organizations are not responsible for difficulties caused by postal service delays or inadequate postage.

Centers Outside the United States or Canada

Candidates wishing to take Exams 3, 5-9 outside the United States or Canada should include an additional fee of $40. Requests must be made at least two months before the examination date.

Languages Other Than English

Exams 1, 2, and 4

Examination questions and instructions will be printed, and examinations administered, in English except in Canada where examination booklets will be printed in both French and English.

Exams 3, 5-9

Examination questions and instructions will be printed, and examinations administered, exclusively in English. Should a candidate wish to respond to any or all of the essay questions in a language other than English, advance notice of the language selected must be provided to the CAS Office when applying to write an examination. Provided such advance notice was received and a suitable translator is available, responses submitted in languages other than English will be translated into English by qualified translators and graded exclusively in translation. If advance notice has not been provided, non-English responses will not be graded. For non-English responses provided in languages other than French, a translation fee of $200 per examination must be submitted along with the examination fee. If a suitable translator cannot be engaged before the date of the examination, the candidate will be notified and the translation fee refunded. The CAS cannot guarantee the accuracy of any translation. Appeals based upon errors in translation of candidates' responses will not be considered. Grade reports for examinations requiring translation may be delayed.

Special Arrangements for Candidates With a Disability

A candidate with a disability who needs special testing arrangements must submit a written request to Preliminary Actuarial Examinations (for Exams 1, 2, and 4) or the CAS (for Exams 3, 5-9) for each examination the candidate intends to write. Documentation of the disability (e.g., physician's statement, diagnostic test results), as well as the need for special arrangements, are required of each candidate; previous accommodations given to the candidate in an educational program or work setting may be considered. Requests for special arrangements and supporting documentation must be submitted at the applicant's expense at least two weeks before the registration deadline.

Refunds

Exams 1, 2, and 4

Any candidate who submits an application for Exams 1, 2, or 4 and subsequently does not write the examination should submit a written request for an examination fee refund. This request must reach Preliminary Actuarial Examinations not later than June 30, 2004, for the Spring Examinations or December 31, 2004, for the Fall Examinations. Refund requests may be sent via e-mail to exams@soa.org or by fax to (847) 706-3599. Late requests will not be considered. A $50 administrative fee per examination is assessed for all refunds. Examination fees for Exams 1, 2, and 4 are only refundable from Preliminary Actuarial Examinations. Late registration fees, change-of-center fees, and special center fees will not be refunded in any case.

Exams 3, 5-9

Any candidate who submits an application for Exams 3, 5-9 and subsequently does not write the examination should submit a written request for an examination fee refund. This request must reach the CAS Office not later than June 30, 2004, for the Spring Examinations or December 31, 2004, for the Fall Examinations. Refund requests may be sent via e-mail to refund@casact.org or by fax to (703) 276-3108. Late requests will not be considered. A fee of $60 per examination will be assessed for all refunds. Change-of-center fees, special center fees, and other additional fees will not be refunded in any case. Refunds will be issued one month after the refund deadline. Refunds are issued in the manner that fees were paid (i.e., by credit to a bank card or by check to an individual or company).

The Examination

Introduction

The examinations for admission to the Casualty Actuarial Society are designed to establish the qualifications of candidates. The Examination Committee creates exams that follow guidelines developed by the Syllabus Committee. Complete coverage of all readings listed in the *Syllabus* is not practical for every exam every year. The goal is to produce exams that contain representative, high-quality questions that test candidates' knowledge of the syllabus material. Thus, the candidate should expect that each exam will cover a large proportion of the syllabus readings and that all readings will be tested at least once over the course of a few years.

The exam questions will be based on the published learning objectives and supporting knowledge statements. It is intended that the readings, in conjunction with the material on the lower numbered examinations, will provide sufficient resources to allow the candidate to perform the learning objectives. The exams will test not only candidates' knowledge of the subject matter, but also candidates' ability to apply that knowledge.

Order of Examinations

In the development of the *Syllabus* readings and examination questions, it is assumed that candidates are familiar with the material covered on earlier examinations. Therefore, it may be beneficial for candidates to take examinations in numerical order. There are, however, circumstances when another order might be more appropriate. For example, a candidate may wish to study an exam that is closely related to his or her current work.

To help candidates decide which exam to take, the following chart indicates which exams assume knowledge of material found on prior exams. Most candidates will find it easiest to study for an exam after studying for all of the exams listed in the "prior knowledge" column.

	Assumes Prior Knowledge from the Following Exam(s)
Exam 1	None
Exam 2	None
Exam 3	Exams 1 and 2 (Interest)
Exam 4	Exams 1 and 3
Exam 5	Exams 1 and 2
Exam 6	Exams 1 and 2
Exam 7	Exams 2, 5, and 6
Exam 8	Exams 1, 2, 3, 4, 5, and 6
Exam 9	Exams 1, 2, 3, 4, and 5

Notes on Order of Examinations:

- Exams 3, 4, and 9 make extensive use of Exam 1 material. Exams 5, 6, and 8 assume an understanding of Exam 1 material.

- Both Exams 5 and 6 are approachable without detailed knowledge of the material on Exam 2. A candidate who has studied this material, however, may gain a deeper understanding of the material on Exams 5 and 6 and what motivates it.

- Because they are so closely related, it makes sense for most candidates to take Exam 4 immediately after Exam 3. Many candidates find it easier to study for these more mathematical exams when they are not too far removed from college math.

- Exam 4 covers the theory of credibility. Credibility theory is applied in Exams 5 and 6. Candidates who have mastered credibility theory in Exam 4 may find its application more intuitive on Exams 5 and 6. On the other hand, candidates who have experience applying credibility on Exam 5 (or to a lesser extent Exam 6) may find the theory on Exam 4 more tractable.

- There is a great deal of thematic overlap among Exams 7, 8, and 9. Candidates may find their understanding of whichever one they study last enhanced by the material learned on the other two.

Requirements for Admission to Examination Center

To be admitted into an examination center, each candidate must present a positive identification with a signature and a photograph (e.g., driver's license, passport, school or work ID, etc.). If a photo ID is not available, the candidate must present *two* forms of identification with a signature, with at least one form containing a physical description (height, weight, hair color, eye color, etc.). Each candidate will be required to sign in at the examination center. A candidate who does not present positive identification or who refuses or is unable to provide a matching signature will not be permitted to write the examination. For Exams 1, 2, and 4, candidates also must present a valid Ticket of Admission that will be sent with *Instructions to Candidates* from Preliminary Actuarial Examinations.

Candidates should arrive at the examination center at least 45 minutes before the examination is scheduled to begin. Candidates may not leave until two hours after the start of the examination. For Exams 3, 5-9, candidates may not leave during the last 15 minutes of the examination.

Conduct of Examinations

The examinations are recorded exclusively in writing. Except as is noted in the following paragraphs, no books, papers, typewriters, slide rules, or electronic or mechanical aids for computation of any kind may be brought into the examination room by candidates, nor may any candidate communicate with, or obtain any assistance from, any other candidate during the examination. Candidates must respond in English unless advance notice is given (see "Languages Other than English" on page 9). Examination answer sheets are not returned to candidates.

For Exams 3, 5-9, a candidate wishing to obtain his or her own examination booklet and scrap paper subsequent to the examination must bring a self-addressed stamped envelope to the examination center. The recommended minimum postage is $2.67 for domestic mail in the U.S. Approximately one week after all examinations have been completed, the examination and a *preliminary* list of multiple-choice answers for Exams 3, 5-9 will be posted in the "Admissions" section of the CAS Web Site. Sample solutions for essay questions will not be available until they are published on July 30, 2004, for Spring Examinations and January 31, 2005, for Fall Examinations.

Calculators

Electronic calculators will be allowed in the examination room for all examinations. Only the calculators listed below may be brought into the examination room. Books, papers, computers, or other electronic devices may not be brought into the examination room. Candidates may use the battery- or solar-powered models of the following Texas Instruments calculators:
- BA-35 (the official CAS/SOA calculator)
- BA II Plus
- TI-30X
- TI-30Xa
- TI-30X II (IIS solar or IIB battery)

The CAS/SOA logos are not required on the calculator. Candidates may use more than one of the approved calculators during the examination. For those using the BA II Plus or TI-30X II (IIS solar or IIB battery) models, candidates will be required to show examination proctors that the memory has been

cleared prior to the start of the examination. For the BA II Plus, clearing will reset the calculator to the factory default settings.

Calculator instructions cannot be brought into the examination room. During the examination, the calculator must be removed from its carrying case so the proctor can confirm it is an approved model. **Any unauthorized calculator brought to the examination center will be confiscated for the duration of the examination. Candidates using a calculator other than the approved models will be subject to examination disqualification or other disciplinary action.**

Candidates may purchase calculators from stores or directly from the manufacturer: Texas Instruments, Attention: Order Entry, P.O. Box 650311, Mail Station 3962, Dallas, TX 75265; telephone: (800) 842-2737; Web site: www.ti.com.

It is the candidate's responsibility to see that the calculator used during the examination is in good working order. Supervisors will have a spare approved calculator available for a candidate whose calculator malfunctions. It is not to be distributed to a candidate without a calculator or whose unauthorized calculator has been confiscated.

Examination Discipline

Candidates must not give or receive assistance of any kind during the examination. Any cheating, attempt to cheat, assisting others to cheat, participating therein, or engaging in such improper conduct as listed below, is a serious violation and will result in the CAS disqualifying the candidate's paper, and other disciplinary action as may be deemed appropriate. Candidates have agreed in their applications for examination to be bound by the rules and regulations governing the examinations.

Examples of improper conduct include but are not limited to:

1. Gaining access to examination questions before the examination or aiding someone else to do so.
2. Using an unauthorized calculator (as defined in the *Syllabus*) or other mechanical aid that is not permitted.
3. Looking in the examination book before the instruction to begin is given.
4. Marking or otherwise writing on the examination book or answer sheet before the instruction to begin is given.
5. Making any changes, additions, deletions, or otherwise marking, erasing, or writing on the examination book or answer sheet after the time for the examination has expired.
6. Having access to or consulting notes or books during the examination.
7. Looking at or copying from another candidate's paper.
8. Enabling another candidate to copy from one's paper.
9. Talking or otherwise communicating with another candidate during the examination.
10. Disturbing other candidates during the examination.
11. Consulting other persons outside the examination room during the examination.
12. Copying questions, answers, or answer choices to take from the examination room.
13. Taking an examination book from the examination room.
14. Taking an examination for another candidate.
15. Arranging to have another person take an examination for the candidate.
16. Threatening or physically or verbally abusing a supervisor or proctor responsible for curbing or reporting improper conduct.

17. Disclosing the contents of an examination to any other person prior to the examination's release. For CAS Exams 3 and 5-9, this would generally apply to the day when the examination is administered.

18. Presenting false information on an examination application.

19. Failing to remain in the examination room for a minimum of two hours during the examination.

20. Failing to follow other examination instructions.

The CAS Examination Committee, or its designee, will investigate any irregularity or suspected violation of the rules involving the examination process, and a determination will be made regarding the matter. Where there is a determination to invoke a penalty, the candidate is advised by letter. In the case of a candidate who is a member of the CAS, the candidate's conduct will be reported to the Actuarial Board for Counseling and Discipline (ABCD) or to the Canadian Institute of Actuaries (CIA) if the final penalty invoked is more than disqualification of the examination.

Candidates for the CAS Examinations are expected to follow the rules and procedures included in this *Syllabus*, the *Notice of Examinations*, and the "Instructions to Candidates" printed on their examination booklets as well as announcements made by the supervisors at the examination locations. All candidates, on their applications for examinations, are required to read and sign the following statement: "I have read the rules and regulations concerning the examination(s) for which I am applying and agree to be bound by them. I also agree that the results of any examination(s) which I take, and any action taken as a result of my conduct may, at the sole discretion of the Casualty Actuarial Society [and/or the Society of Actuaries for jointly administered exams], be disclosed to any other bona fide actuarial organization that has a legitimate interest in such results and/or actions."

The CAS may, at its sole discretion, disclose to any other bona fide actuarial organization having a legitimate interest, information on the identity of candidates determined to have committed a serious examination violation (those for which the penalty is greater than the simple disqualification/nullification of the examination), and the specific penalties imposed on those candidates.

If an actuarial organization with which the CAS has a working relationship (such as the Society of Actuaries) invokes a penalty against a candidate for improper conduct during an examination for which the CAS is not a joint sponsor, the CAS will invoke the same penalty for all CAS-sponsored examinations. If the CAS takes any disciplinary action, it will notify the other actuarial organizations of that action.

These standards may seem stricter than those which candidates are accustomed to in other examination environments. The CAS maintains these strict standards because the examinations are such a significant part of a candidate's career. Therefore, the equitable administration of the examinations and enforcement of the highest standards of conduct cannot be emphasized too strongly.

Candidates may obtain a copy of the full CAS Policy on Examination Discipline by sending a written request to the CAS Office.

Multiple-Choice Questions

Exams 1-4 consist entirely of multiple-choice questions; other CAS examinations may have a section of multiple-choice and/or true/false questions. Each multiple-choice problem includes five answer choices identified by the letters A, B, C, D, and E, only one of which is correct. A separate answer sheet provides a row of five ovals for each problem, identified with the letters A, B, C, D, and E, corresponding to the five answer choices. After deciding which answer is correct, candidates should blacken the oval that has the same letter as the appropriate answer. Since the answer sheets are scored by optical scanning equipment, a Number 2 pencil must be used to blacken the ovals. It is important that only one oval be blackened for each question.

Guessing Adjustment

For Exams 1, 2, and 4, no guessing adjustment is made to candidates' scores. Therefore, candidates will maximize their scores on the joint examinations by answering every question. On Exams 3, 5-9, multiple-choice and true/false questions are scored in such a way that there is no advantage or disadvantage to be anticipated from guessing answers in a purely random fashion as compared with omitting the answers entirely. No additional points will be given for multiple-choice questions left blank, but one-quarter of the point value for each question will be deducted for each incorrect answer. On true/false questions, the point value of the question will be deducted for each incorrect answer.

Lost Examinations

The CAS is not responsible for lost or destroyed examinations. In the case where an examination is lost or destroyed, the examination fee will be refunded. The CAS and other organizations that jointly administer and/or jointly sponsor CAS Examinations will assume no other obligation and candidates must take the examinations with this knowledge. The only exception to this policy is for multiple-choice Exams 1, 2, and 4. Whenever reasonably possible, Preliminary Actuarial Examinations will make use of a candidate's examination book to reconstruct the answers selected by the candidate. Therefore, candidates may want to circle or otherwise clearly indicate their answer choices in the examination books. However, additional time in the examination period will not be given for candidates to do this. If a candidate receives a passing grade as a result of the review of the examination book, the examination fee will not be refunded.

Grades and Accreditation

The actual grading process is fairly similar for both the jointly administered Exams 1, 2, and 4 and CAS-specific Exams 3, 5-9. The following provides details about CAS-specific Exams 3, 5-9.

CAS Examination Processing

Examination papers are sent to the CAS Office upon completion of the examination. The CAS Office prepares the examinations for the grading process. Approximately one week after all examinations have been completed, the examination and a *preliminary* list of multiple-choice and true/false answers will be posted in the "Admissions" section of the CAS Web Site (www.casact.org). This is intended to assist candidates and the Examination Committee in determining whether they believe a question is ambiguous or defective.

Defective Questions

Occasionally, through error or because of varying interpretations, a question on an examination is found to be ambiguous or defective. If a candidate believes a question is ambiguous or defective, he or she should bring this to the attention of the Examination Committee in writing within two weeks after the examination date. The candidate must mail or fax this letter to Preliminary Actuarial Examinations for Exams 1, 2, and 4, or to the CAS Office for Exams 3, 5-9. The letter should include detailed reasons why the question is believed to be ambiguous or defective. In addition, statistics are calculated on each problem to see how well the candidates answered the question. The statistics can indicate that a question may be faulty and the question will be reviewed even without a candidate writing.

The CAS Examination Committee or Preliminary Actuarial Examinations will investigate all questions brought to their attention in this manner. Correspondence that does not reach these organizations within two weeks is unlikely to be considered in the grading process.

Any multiple-choice or true/false question found to be defective is carefully examined to determine the most reasonable way to correct the situation. In some cases, the question is discarded, leaving scores and rankings as they would have been if the defective question had not been asked. In other cases, more than one answer for a multiple-choice question is given credit for being correct.

Grading of Examinations: A Timeline

Week 1

After the examinations are administered, proctors return the packages to the CAS Office. Staff members log in each exam. Signatures are verified and the candidate numbers are checked against the proctor's report. As each envelope is opened the candidate's number must be checked against the number on the short answer card (both the written number and the coded number) and on all of the essay sheets. The short answer cards are prepared for scanning and the essay sheets for all the candidates must be sorted so that individual questions can be photocopied for the graders.

Week 2

Essay questions are sent to a printer for photocopying. Short answer cards are scanned twice and output is compared to ensure accuracy. Random checks are made of each series of cards to make sure the scanner is working properly. When the essays return from the printer, the copies are packaged and sent to the individual graders. Any comments on ambiguous or defective questions are forwarded to the graders, exam part chair, and the general officer of the exam series for review.

Weeks 3 and 4

Committee members review candidate comments about possibly defective questions and decide how they will be handled in the grading process. Discussions on the best course of action are often a very time-consuming part of the grading process.

Each essay question on the exam is sent to two graders. Each grader is given two to four questions to grade. There can be 300 to 700 answer sheets for each grader to evaluate. A suggested answer key exists for each question, but alternative solutions may be correct, and the grader must be open to different approaches to a problem. About two dozen responses are graded and then the results are compared. The grading partners will establish a consistent grading scale and then evaluate the solution key. Consistency and accuracy are the most important factors in grading the questions. After looking at hundreds of papers, it is possible that a grader could slightly shift focus (either harder or easier). To minimize the chance of this happening the graders will begin grading at different points on the candidate list, then when the two grades are compared any significant differences will be checked. Each grader prepares a diskette with each candidate's number and the score for each question.

Week 5

The part chair holds the grading session with the graders. The first step is running the data through a standard grading program, verifying the data, and noting any significant discrepancies. For each candidate and each question the scores of each grading partner must be within a prescribed tolerance. If the scores do not fall within this tolerance the partners must discuss the candidate's answer sheet and come up with a decision on what the point value should be. When all the questions have been reconciled to the required tolerance, the scores are totaled and a tentative pass score is selected based on various statistics and guidelines.

This triggers the second round of reconciliation. Any candidates who have scores within a certain number of points from the tentative pass score will have all of their answers reconciled completely. This gives an exact score for any candidate near the passing score. The scores for any candidates who are close to passing will be checked manually as well. The committee will then look at the statistics one more time and make a final recommendation for the passing score.

Weeks 6 and 7

After the grading session, the part chair will submit a report to the general officer of the exam series and the Examination Committee chairperson. In the report, the part chair recommends a passing score, gives a detailed analysis of the exam, and notes any unusual questions or situations that required special handling. The chairperson and general officer hold a teleconference with the vice president–admissions to discuss all of the exams from the series and to finalize the passing scores.

Week 8

After the passing score has been approved by the vice president–admissions, the data is verified and released to the CAS Office to update each candidate's record, post a list of passing candidate numbers on the CAS Web Site, and print and mail the grade reports.

Determination of the Pass Mark

According to CAS policy, the overriding goal in setting the examination pass marks is to pass all candidates who, in the opinion of the CAS, have demonstrated by their exam responses a sufficient grasp of the syllabus material and to fail those candidates who have not. No predetermined pass ratio will be used for setting the pass mark. Because the level of difficulty for each examination may vary from year to year, each Part Committee collects extensive data to ascertain the level of difficulty of its examination. The Part Committee compares the performance of the present year's candidates to the performance of candidates from prior years. Appropriate recognition is given to any peculiarities that may appear in connection with the answers to any question on an examination despite all the care taken in setting the examination questions.

After this, the pass mark is set consistent with the above goal. The examination part chairperson presents the recommended pass mark with the supporting data to the general officer who oversees that examination part, the Examination Committee chairperson, and the vice president-admissions. The final decision on the pass mark is the responsibility of the vice president-admissions.

The percentage of candidates passing will vary from year to year; however, those candidates demonstrating the required level of competence with the material will pass.

After the pass mark is finalized, each candidate is assigned a score. Scores of 0 to 5 are assigned to candidates who do not pass. On this scale, each interval is 10 percent of the pass mark. For example, a grade of 5 means failing with a mark of at least 90 percent, but less than 100 percent, of the pass mark. A grade of 0 means that the candidate's score is less than 50 percent of the pass mark. Candidates at or above the passing mark receive a Pass.

The CAS releases the pass score information for Exams 3, 5-9 after the appeal deadline for the exam session has passed. It is posted in the "Admissions" section of the CAS Web Site (www.casact.org). The purpose of releasing the pass scores is to help candidates prepare for future exam sittings. The 75th and 95th percentile scores are also released for each exam. These two key statistics indicate the performance level achieved by the better prepared candidates on the exam. Raw scores are not provided to candidates.

Examination Results

Examination results are available approximately eight weeks after the examination date. After exam results are received at the CAS Office, a list of passing candidate ID numbers will be posted in the "Admissions" section of the CAS Web Site (www.casact.org) between 3:00 and 3:30 p.m. Eastern time. Individual statements of examination results generally are mailed to candidates on the day that they are posted on the CAS Web Site.

For Exams 3, 5-9, passing candidates are informed that they passed the examination, but they are not given a numeric score. Candidates with scores of 0 to 5 are informed of the score. Several weeks later, a list of the names of all passing candidates is posted on the CAS Web Site.

To preserve candidate confidentiality, in the event of a lost or misplaced candidate ID number, the candidate ID number will be mailed to the candidate upon request. Under no circumstance will a candidate number be given over the telephone.

Analyses for Exams 3, 5-9

Candidates who did not pass Exams 3, 5-9 will automatically be sent an analysis of their examination with the grade notification. The analysis of an examination is computer-generated. Actual points received for multiple-choice and true/false questions will be displayed. For essay questions, ranges will be given for both the actual score and how the actual score relates to the mean of all candidates. This information is intended to provide the educational guidance that most candidates desire. Candidates who did not pass an exam may request a reprint of their exam analysis before the appeals deadline.

Appeals for Exams 3, 5-9

Once candidates have received an analysis of their exam, they may appeal their grade. Only candidates with valid appeals will be considered. In order to aid the candidate when appealing, preliminary answer keys for multiple-choice and true/false questions will be available the week following the examinations. Sample answers to essay questions will be available on July 30, 2004, for Spring Examinations, and January 31, 2005, for Fall Examinations. The sample essay answers are actual responses that have received credit and are illustrative of successful answers, although they may not be considered perfect answers.

There are two types of valid appeals. The first type is an administrative check of the candidate's short answer card to verify that the card reader scanned the card correctly and that the output file reflected this data. The second type of appeal is for an incorrect answer key or sample essay answer. If the candidate believes that the answer key or sample essay answer is incorrect or there is an alternative correct solution, the candidate must provide specific information on why his or her solution is correct. With specific information, the Examination Committee can research the answer properly and reply to the candidate. An example of an invalid appeal would be the following: "I am appealing my score of 5 on Exam 9, please recheck my examination." Another example of an invalid appeal would be: "On question number 2, I believe I should get full credit because I answered the following . . ."

Appeals must reach the CAS Office not later than August 31, 2004, for Spring Examinations and February 28, 2005, for Fall Examinations. When a valid appeal is received, it is reviewed by the part chairperson and a recommendation is made to the Examination Committee chairperson. The Examination Committee chairperson will respond based on the recommendation of the part chairperson.

Confidentiality of Examination Records

The fact that any candidate has passed a particular examination is considered public knowledge. Any further information as to examinations taken by candidates and scores received by candidates is available only to the candidates themselves, to Examination Committee officials if required for committee purposes, and to the CAS Office, unless the candidate requests in writing that such information be provided to someone else. However, if any action is taken against a candidate as a result of his or her conduct (as described in the section on Examination Discipline), the Casualty Actuarial Society, at its sole discretion, may disclose such information to any other bona fide actuarial organization that has a legitimate interest in such results and/or actions.

Transition Programs

The CAS generally reviews and makes revisions in the study material on an annual basis. Occasionally, a major topic will be added to or deleted from the study material. A major topic is defined as a series of readings comprising a segment of an examination. When a major topic is deleted from the recommended study material, the Syllabus Committee will determine if a transition program is appropriate. A transition program generally will be appropriate when candidates are in a position to lose credit for a segment of an examination.

A transition program usually will provide candidates with at least two opportunities to complete the requirements for that examination. The completion of the requirements will result in the achievement of credit for that entire examination. The failure to fulfill the requirements for that complete examination could result in the expiration of credit for that deleted topic at the end of the transition period. The CAS Board of Directors must approve any transition program.

CAS Membership Requirements

Associateship

Candidates for Associateship in the Casualty Actuarial Society must fulfill the examination requirements by successful completion of, or credit for, Exams 1-7. Exam 7 is nation specific, covering U.S.- or Canadian-specific material, and passage of either of the two examinations fulfills the completion requirements. Candidates must complete the CAS Course on Professionalism prior to admission to the CAS.

After completing the prescribed examination requirements, all prospective Associate members must make formal application to the Casualty Actuarial Society. The CAS Office will mail application materials to these candidates, including instructions for obtaining letters of reference from two CAS members. Obtaining the two letters of reference is the prospective Associate's responsibility. If no members of the CAS are familiar with the prospective Associate and his or her work history, references

from members of the American Academy of Actuaries, the Canadian Institute of Actuaries, the Society of Actuaries, or senior executives where the candidate is employed may be substituted. For further information on alternative, acceptable references, please contact the CAS Office. An application for membership will not be processed without these references.

After all requirements are met and application is made, each candidate is voted on by the CAS Executive Council. Upon approval of the CAS Executive Council, the candidate will be admitted as an Associate of the Casualty Actuarial Society (ACAS). Candidates approved by the Executive Council will be notified by letter from the CAS president.

Fellowship

In addition to fulfilling all the requirements of Associateship, successful completion of, or credit for, all nine examinations is required to fulfill the examination requirements for Fellowship and to be designated as a Fellow of the Casualty Actuarial Society (FCAS).

CAS Course on Professionalism

The CAS Course on Professionalism is designed to present candidates with real situations that contain ethical and professional issues for the actuary. Volunteer members of the CAS facilitate small group discussions of actual case studies.

Although grades are not given for the Course on Professionalism, candidates must actively participate in order to receive credit. Successful completion of this course is required before a candidate can become a member of the Casualty Actuarial Society. Candidates are urged to register for this course when they have passed five or more CAS Examinations. (A candidate must have passed five Associateship examinations to be eligible to take the Course on Professionalism.)

Dates for the CAS Course on Professionalism will be posted in the "Admissions" section of the CAS Web Site (www.casact.org). Registered candidates will receive a study book of required readings before the start of the course. Each course is limited to 60 participants; early registration is recommended. Facility information and course times will be provided upon registration.

Waiver of Examinations for Associateship

Waiver of individual examination requirements will be granted by the CAS Board of Directors in instances where an applicant has passed or received credit for examinations sponsored by another recognized actuarial organization that cover equivalent material in both subject and depth. The granting of waivers by the Board will be based on the recommendation of the vice president-admissions. The vice president-admissions' recommendation will be guided by the policy established by the CAS Education Policy Committee.

The CAS generally will not grant waiver of all or any portion of its examination requirements for either work experience, contribution to actuarial literature, academic courses of study, or examinations of non-actuarial organizations. Individuals who claim competence in the areas covered by the examinations should not have difficulty demonstrating their competence by participating in the examination process.

The Education Policy Committee has established the specific policies outlined below that cover the most common requests for waiver of examination requirements.

1. The CAS recognizes the examinations sponsored by the Faculty of Actuaries (Scotland) and the Institute of Actuaries (United Kingdom). CAS waivers will not be granted for Faculty or Institute examination credit earned through coursework except for those universities on the Faculty or Institute's approved list as of May 7, 2000. Credit will not be given to Fellows of the Faculty or Institute who have attained their designation through mutual recognition rather than through the standard Faculty or Institute credentialing process. Fellows by mutual recognition should pursue examination waivers based on their original credentials.

The following waiver policy has been approved by the CAS Board of Directors for Exams 1-4.

CAS Exam	Faculty or Institute Subject
1	101
2	102, 107, and 108
3 and 4	103, 104, 105, and 106
1, 2, 3, and 4	FFA or FIA

2. In Fall 2003, the CAS began to offer its own version of Exam 3. The CAS will grant credit for CAS Exam 3 to those who successfully complete SOA Course 3 in the current education and examination structure.

3. The CAS recognizes the examinations sponsored by the Institute of Actuaries of Australia. Credit will be granted for examinations passed or waived in accordance with examination equivalencies between the CAS *Syllabus* and the IAA syllabus. The CAS will not grant credit for examinations waived on account of academic records achieved in North American universities, nor for credit granted to candidates not qualifying directly in obtaining membership through the normal qualification/examination process.

Candidates requesting a waiver of an examination requirement should present their request to the vice president-admissions with appropriate evidence that demonstrates the passing of (or score on) the actuarial examination equivalent for which a waiver is requested. The vice president-admissions will review all such requests and recommend action to the CAS Board of Directors.

Please address all waiver requests to:

Vice President-Admissions
Casualty Actuarial Society
1100 N. Glebe Road, Suite 600
Arlington, VA 22201-4798

Waivers are considered on a case-by-case basis for examination equivalents of actuarial organizations not named above. Candidates must present their requests to the vice president-admissions and include with their applications documented evidence that demonstrates the asserted equivalence, as well as the appropriate educational policy material of their local actuarial organizations. If such material is not included, the vice president-admissions will request it from the candidates. The vice president-admissions will forward the request to the Education Policy Committee for a determination of whether sufficient equivalence exists to permit granting any examination waiver.

HINTS ON STUDY AND EXAM TECHNIQUES

Editor's Note: These hints do not include any material on which candidates will be examined, but are provided by members of the CAS Syllabus and Examination Committees to encourage candidates to do their best when sitting for CAS Examinations.

"Hints On Study and Exam Techniques" is largely based on the experience and advice of others and was originally prepared for Society of Actuaries candidates by James L. Clare. Later, it was adapted by G.D. Morison for use by CAS candidates and was updated in 1992. The CAS will be glad to consider incorporating further comments and suggestions periodically. If you have any changes to suggest, please send them to the CAS Office.

Motivation

Motivation is the single most important ingredient in learning—and in passing examinations. Motivation suffers when candidates worry about or are preoccupied with personal matters or other problems. This suggests that candidates should keep studying and examination taking at the very top of their lists of priorities, and should always have a constructive attitude about their studying. In particular, candidates should approach the examination as an opportunity to enhance their knowledge and understanding of actuarial science, rather than as an obstacle in their paths to membership in the CAS.

Motivation is increased by incentives, such as the following:

- Passing actuarial examinations requires many hours of study—more for some people and less for others—but often more than many candidates realize. Putting in enough hours can actually save a candidate time. Suppose, for example, that mastering the syllabus for one examination will take a candidate 400 study hours, and that one candidate only puts in 300 hours and fails the examination the first time. He or she then puts in a second 300 hours and passes the examination the second time. That candidate will have spent 600 hours, when by studying 400 hours the first time around, he or she would have saved 200 hours, not to mention passing one year sooner. It is recommended that candidates decide for themselves how many hours they really need to study, and then do that much studying—the first time around.

- Candidates can increase their motivation level by regarding the examinations as a stepping stone to greater responsibility at their places of employment, to opportunities for getting more done on their own, and to greater results and rewards from their work.

- Candidates can also increase their motivation through sufficiently intensive and sustained study so that they come to appreciate more fully the fascination of the various subjects, and the interrelationship between them.

A number of doctors, educators, executives, and personnel people all agree that motivation can be greatly increased by having a goal in mind. Candidates must determine their goals and keep them in mind.

Techniques

It has been proven many times in various countries, both by individuals and by controlled groups, that improved study and examination techniques can strengthen a candidate's mastery of a subject and increase his or her examination scores significantly. Provided that the candidate is motivated and spends enough hours studying, techniques such as those given here may often make the difference between failing or passing an examination.

Each person has his or her own strengths and weaknesses, so candidates are advised to work out their own personal sets of techniques which will work best for them. What follows is merely a set of suggestions to help candidates in getting started in building up their own techniques.

The Challenge

It is easy to underestimate the effort that is required because substantial changes may be needed to switch from college or university life to successful study of actuarial examinations.

University courses often stress understanding, and usually do much to smooth the path for the student with lectures, personal contacts, organized places of study, and a focus on learning.

By contrast, actuarial candidates must work a great deal on their own and generally must make a "long and grueling" journey to reach their goals. Much actuarial studying is normally fit in after a full day's work, or is done on a weekend when one's friends are free to do as they please. Making adequate time available for studying requires sustained self-discipline and is a purely individual and personal responsibility.

Schedule of Study

There is only one substitute for hours of study time omitted one week—at least as many additional hours of study in another week. An unavoidably "necessary condition" for success in studying (though not necessarily "sufficient condition") is simply spending enough total hours studying.

Candidates must decide how many hours in total they need to study. Then they need to set out their schedules in writing, specifically stating the weekday evening and weekend periods allocated to studying. They then should total the number of hours made available. If the total hours scheduled are less than the total hours necessary, candidates should expand their schedules until they at least have equalled the required total time plus an additional cushion for absorbing time that will inevitably be lost along the way on account of illness, work pressures, etc.

Then candidates should fit all the segments of the *Syllabus* into their schedules so that they will thoroughly cover the course of reading in good time before the examination, with time left over for a thorough final review. It is important for candidates to spread their time over the entire *Syllabus* in some deliberate way, for example, in proportion to the pages of reading material on the *Syllabus*.

Candidates may find it helpful to study several subjects within an examination, or all of them in parallel. This gives them more variety each week, and may give them a combination of both study that is more appealing and study that requires greater effort and concentration. Particularly demanding study may be best left for weekends when candidates are less fatigued from regular work.

It is a good idea for candidates to keep a record of the hours they spend studying. Even if candidates are completely confident that they know the *Syllabus* before putting in their required total hours, there is much to be said for carrying out the full schedule and completing the total time quotas.

Retention

As part of human nature, our memories forget facts and ideas most rapidly during the time immediately following our study of them. For a given number of study hours, therefore, candidates will remember more if they review promptly and frequently. It is recommended that candidates review what they have learned as part of ending their study for the day. As they begin their next study session, candidates should review what they learned the last time and what they learned during other recent sessions. Then they can recall points they have learned during odd spare moments in between study sessions. It is important for candidates to leave time for a thorough final review before the examination.

In their study for the mathematical sections of the Associateship examinations, candidates are advised to work out as many examples as possible in order to acquire facility in the application of the mathematical principles and methods to specific problems.

There are some analogies that can be made between preparing for an actuarial examination and learning to drive a car. Most inexperienced drivers have good motivation for learning to drive and have a strong goal clearly in mind. Yet they still need to practice their driving skills until they become "second nature." This is easier to do if they keep practicing their driving in the days immediately after a lesson. Candidates should equally be the master of their actuarial studies by the time they enter the examination room. Experienced drivers should be able to pass a driving test not just on a few familiar streets, but over any legal route. In the same way, actuarial candidates should be able to pass any set of examination questions which has been drawn from the *Syllabus*.

Candidates should note the considerable emphasis in actuarial examinations on knowledge. However, they should remember that the best way to learn facts by heart is to understand the whole subject, and to tie together ideas that are related. They should look at any single subject from several different angles, relating what they learn to what they know already. Candidates should look for as many connections as they can between their actuarial work and their actuarial studies.

As humans, we learn by doing. While the extent of a candidate's notes will be a matter of his or her own personal tastes, taking thorough notes will be a good investment of time for most people. For candidates, "translating" the subject matter into their own words helps their memories, and forces to their attention those items that they do not really understand and require further study. Upon reviewing their notes, if candidates find gaps in their knowledge or in their understanding, they should bear down on those areas and master them.

Another study technique candidates might want to try is to test themselves as they go along. They can review previous examinations when they start to study to get an idea of the mastery of the *Syllabus* expected. Candidates can also take these as "trial examinations" to help them in testing their knowledge and understanding of the course of reading, and in improving their examination speed and confidence. Some candidates deliberately test themselves; others prefer not to do so.

Candidates should expect a gradual gathering of momentum as they begin their study for a particular examination. By keeping at it, according to their plans, candidates will find their rate of progress speeding up after the first few weeks.

When a candidate finds himself or herself getting very "stale," one possibility is to stop studying altogether for, perhaps, three days. Then the candidate should continue on with his or her study plan, no matter how he or she feels, for at least the next month or six weeks. A candidate's study plan should have enough spare time available in it to allow for such occasional "down time." A mixed schedule, with a weekly combination of subjects that the candidate likes and subjects that he or she finds difficult, will help to minimize staleness.

Discussing the *Syllabus* with friends taking the same examination, or with others who have passed the examination, will help candidates remember the material firmly and to understand it. It also helps candidates to realize their own gaps and difficulties. If effective study circles and tuition courses can be found, they will give candidates a different slant on the subject, give them a chance to review and to practice, keep them moving through the *Syllabus*, and help to combat lethargy and self-satisfaction.

Candidates should beware, however, of someone else doing their own thinking for them. It is imperative that they develop and maintain their own command and understanding of each subject. When reading, candidates should challenge the author in their minds and debate with him or her, rather than merely swallowing everything whole.

Formulating Answers

Multiple-Choice Questions

Candidates can definitely improve their speed and mastery by seriously practicing on sample examination-type questions before the examination. It helps to have a good understanding of the subject material. Candidates can also develop valuable shortcuts, such as eliminating impossible answers by checking out boundary conditions or by inspecting other aspects of certain suggested solutions, or by substituting numerical values and cutting out some answers. Since questions are varied, candidates will need a variety of techniques to cope with them.

In a multiple-choice examination, speed is an important factor. Candidates increase their chances of passing if they are able to seriously attempt each question on the entire paper at least once. It may help them to determine the proportionate number of questions to answer in the first half-hour of the examination, to check how much ground they cover in that time, and then accordingly either speed up, or slow down and dig more deeply.

When pressed for time, it may pay for candidates to omit a few multiple-choice questions that they expect to take more time than average, so as to have time for a larger number of more quickly answered questions. For example, a cluster of questions may have a common introduction that a candidate does not readily grasp, in which case he or she might skip the entire cluster at a first attempt.

Candidates may find it helpful to keep a list of the number of the questions not answered so that they quickly can get an idea of how many they are omitting. This will allow the candidate to quickly return to these questions.

Candidates should change their answers only if they are sure that their first solution was wrong.

Essay Questions

The model response to the typical essay question is brief, less than one-half of a written page. Be concise—candidates do not need to answer in complete sentences when a well-composed outline format is more appropriate. Candidates should not waste time on obscure details. They should show that they have learned the relevant material and that they understand it. They should state the obvious, if it is part of the answer.

For questions that require candidates to work a numerical solution, candidates should take the time to set up the problem so that they document their understanding. They should set forth relevant equations or formulae, then enter appropriate values. They should lay out complicated calculations in tables that demonstrate their understanding of the correct solution.

Candidates should keep each answer relevant to the precise question being asked. They should make sure they first understand exactly what is wanted before they begin to answer a question. When they have written part or all of their answer, they should take another look at the question and make sure they have answered—not their own question—but the question as set on the examination page.

If candidates are asked to "discuss" a proposal, they should list all significant arguments both for and against it.

If a candidate believes that a question is ambiguous, or that it does not provide all the information necessary to answer the question, the candidate should state how he or she interprets the question and/or what assumptions are made to answer it.

Candidates should take time to write legibly, since examiners can only give credit for what they can read. They should try to "organize" their answer. Then, their main aim is to get down as much relevant material as they can.

There is no advantage to answering the questions in any particular order. Candidates may answer the questions in the order given if they wish. Alternatively, candidates can quickly read over the whole

paper, warm up with whichever question comes easily to them, gradually work into the questions they find more challenging, and end on a question that they think can be answered readily even though, by that time, their energy and concentration may be falling off.

Note that since each question is graded separately, each answer must be self-contained. Candidates should not say, "Part of my answer to question 1 is found in my answer to question 3."

It is important that candidates remember that they have limited time. Candidates will find that it is worth checking their progress to assure that they have an opportunity to respond to every question. If they know that a question will take too much time, they can pass it and return to it later, if time permits.

Final Mental Preparations

Olympic and professional athletes often vary their training schedules as a major contest approaches. They often ease up on endurance training, and shift their aim to sharpening their alertness, their effectiveness, and their will to win.

In any examination, it is just as important that candidates be alert and effective, with all their wits about them, and with an eager desire to do their best.

Some candidates fail in the first half-hour or so of an examination. Perhaps it would be more accurate to say they "defeat themselves" in that time. They become pessimistic and discouraged, and think too much about the possibility of their having made a bad start in answering the questions.

Other candidates, with the same ability, knowledge, and preparation—and making bungles just as bad in parts of the examination as the first type of candidates—nevertheless succeed in passing the same examination. With actuarial exams, as in life, the difference between failure and success is often linked to a person's attitude. Confidence and optimism, based on mastery of the subject through hard work and many hours of study, will help a candidate to keep going.

Instead of wasting time and energy worrying about how badly they believe they are doing, candidates should do something constructive on another question. They can always come back later to the weak answer, time permitting.

Candidates should never give up in the examination room. They should use every minute and every second of the available time. They should not "grade their own papers," and decide not to hand in an answer to a question or two because they feel it is all wrong. They should hand in all of their answers, and let the examiners do the grading. At least one candidate has not handed in some answer pages which he or she had condemned in his or her own mind, only to find out later that the work was correct, and to find out still later that he or she had narrowly failed to pass.

Books to Read

Some candidates may find it a good investment of their time to read one or more books discussing study and examination techniques. On the other hand, many candidates have successfully completed all their examinations without reference to such texts. These texts will be of little value to a candidate with solid study habits. For those candidates who have not developed good study habits, then these types of texts are more likely to be worthy of their consideration.

It is up to the candidate to decide for himself or herself on a single strategy to follow, especially if he or she refers to more than one book. While all books will have a common thrust, there may be some differences between them on certain points, such as on the most desirable level of the extensiveness of the notes a candidate should take. It is important for candidates to not chop and change from one technique to another during the time they are studying. Rather, they should read such books as they wish, and decide for themselves a single, clear path to travel—and then stick to it.

STUDY RESOURCES

Study Notes for Exams 1, 2, and 4

Official Study Notes are published to help candidates prepare for the examinations. In some instances, Study Notes are the principal references; in others, they are designed to coordinate the subject for the candidate or to complement other readings. Sample examinations, illustrative solutions, and answer keys for Exams 1, 2, and 4 are available as part of the set of Study Notes. Introductory Study Notes (ISN) contain important information about the examinations, including any changes to the course of readings, changes in examination times or dates, errata, and descriptions of examination formats. Occasionally, the course of reading for an examination may be changed after publication of the *Syllabus*. Such a change will be announced on the CAS and SOA Web Sites and in the ISN for the affected examinations. If any conflict exists between information contained in this *Syllabus* and that contained in the ISN, the ISN will govern.

Study Notes may be downloaded at no charge from the "Admissions" section of the CAS Web Site (www.casact.org) under Web Notes and from the SOA Web Site (www.soa.org). The order form for a hard copy of the Study Notes is available in the "Admissions" section of the CAS Web Site.

Study Kits and Web Notes for Exams 3, 5-9

The readings listed as "Web Notes" in this *Syllabus* may be downloaded at no charge from the "Admissions" section of the CAS Web Site (www.casact.org). For those who do not have access to the Web Site, a printed version of the Web Notes is available for sale from the CAS Office.

The Study Kit contains other required readings not owned by the CAS but for which the CAS has been granted permission to include in the Study Kit. Study Kits and the printed version of the Web Notes will be available December 1, 2003. Order from the CAS Online Store (www.casact.org) or use order forms that are available in the "Admissions" section of the CAS Web Site or in the back of this *Syllabus*.

2004 Study Kits and Web Notes	Price
Exam 3 Web Notes	$15
Exam 5 Study Kit	$37
Exam 5 Web Notes	$65
Exam 5 2004 Update to the 2003 Study Kit	$14
Exam 6 Study Kit	$20
Exam 6 Web Notes	$65
Exam 7-Canada Study Kit	$110
Exam 7-Canada Web Notes	$11
Exam 7-Canada 2004 Update to the 2003 Study Kit	$31
Exam 7-U.S. Study Kit	$48
Exam 7-U.S. Web Notes	$34
Exam 7-U.S. 2004 Update to the 2003 Study Kit	$14
Exam 8 Study Kit	$25
Exam 8 Web Notes	$24
Exam 8 2004 Update to the 2003 Study Kit	$5
Exam 9 Study Kit	$23
Exam 9 Web Notes	$60
Exam 9 2004 Update to the 2003 Study Kit	$10

Canadian residents must add 7% for GST; Virginia residents must add 4.5% sales tax. For deliveries outside the U.S. or Canada, add 50% of the total cost for shipping. Candidates should check the Study Kits for completeness (i.e., defective pages and/or omissions).

Please allow four to six weeks for delivery. NO RETURNS. NO REFUNDS.

Sample Examination Questions

Exams 1, 2, and 4

Sample examination questions for Exams 1, 2, and 4 are available at no charge in the "Admissions" section of the CAS Web Site (www.casact.org). The sample examinations, illustrative solutions, and answer keys also are included in the complete set of Study Notes. (The order form is available in the "Admissions" section of the CAS Web Site.)

Exams 3, 5-9

Past copies (last three sittings) of Exams 3, 5-9 with answers are available at no charge under "Study Tools" in the "Admissions" section of the CAS Web Site. (Exam 3 may contain three nonconsecutive exams.) Sample essay answers are actual responses that received credit and are illustrative of successful answers, although they may not be considered perfect answers. For those who do not have access to the Web site, a printed three-sitting "Set of Examinations" is available at a charge of $25. Because sample answers are not available until July 31 for Spring Examinations and January 31 for Fall Examinations, the printed "Set of Examinations" will not be updated until after these dates. Please use the CAS Online Store or the order form provided with this *Syllabus*. **NO RETURNS. NO REFUNDS.**

Exams 3, 5-9 will be posted in the "Admissions" section of the CAS Web Site approximately one week after these examinations have been administered. They will include a *preliminary* list of multiple-choice and true/false answers. Sample essay answers and final multiple-choice and true/false answers will be posted on July 30, 2004, for Spring Examinations and January 31, 2005, for Fall Examinations.

In referring to a published prior examination, candidates should keep in mind that the questions were based on the course of readings in effect for that particular examination and may not reflect the current course of readings. Candidates may also expect future examinations to vary somewhat as to the proportions of question styles and subjects. New forms of questions may appear from time to time, and the total number of questions may vary from one exam sitting to the next.

CAS Web Site

The "Admissions" section of the CAS Web Site (www.casact.org) contains the following resources for CAS examinations:
- *Syllabus of Examinations*
- Updates to the *Syllabus of Examinations*
- All readings listed as Web Notes
- Copies of sample and past examinations
- *Notice of Examinations*
- Any change regarding the examinations
- CAS Online Store as well as order forms for study materials
- Online registration for Exams 3, 5-9 and registration forms for all examinations
- Discussion Forum
- Archives of the e-mail study groups
- Candidates' examination status
- *The Future Actuary* newsletter
- *Future Fellows* newsletter
- Frequently asked questions

E-mail Study Groups

The CAS has available e-mail study groups for those preparing for CAS examinations. Information about joining a study group is available in the "Admissions" section of the CAS Web Site (www.casact.org). Those without Web access may join by sending an e-mail to imailsrv@lists.casact.org. In the body of the message, type *subscribe studygroup1 [your full name]*,

subscribe studygroup2 [your full name], etc., as appropriate. For example, *subscribe studygroup3 Mary Doe*. (Please specify *studygroup7C* or *studygroup7U*.) The e-mail list program will take the e-mail address from the sender's e-mail field. Candidates will receive an e-mail confirmation that they have been added to the study group list. Study group messages are archived on the CAS Web Site. Please direct any questions to the CAS webmaster at webmaster@casact.org.

CAS Library

The CAS Library has available for loan all the books marked with a bold **L** in this *Syllabus*. Candidates registered for CAS Examinations and all members of the CAS have access to the library facilities. The CAS Library is located at the CAS Office in Arlington, Virginia.

Books and manuals may be withdrawn from the library for a period of one month without charge. In general, not more than two references may be in the hands of one borrower at a time. Requests must be in writing and must include the borrower's complete name, address, and telephone number. Address requests for library books to:

<div align="center">

Casualty Actuarial Society
Library Service
1100 North Glebe Road, Suite 600
Arlington, VA 22201-4798
Fax: (703) 276-3108
E-mail: library@casact.org

</div>

The CAS Office ships the requested book(s) in the U.S. and Canada via United Parcel Service (UPS) and internationally via Air Mail. Due to delays in the mail system, the CAS requires all shipments of books returned to the CAS Office to be shipped via UPS or an equivalent carrier with tracking capabilities. Please do not use the United States Postal Service. Overdue books will be charged at a cost of 25¢ per day.

Books that are not available through the CAS Library may be obtained by contacting the organizations listed in the "Publishers and Distributors" section in this *Syllabus*.

MATERIALS FOR STUDY

Introduction

The syllabus for the CAS-specific Exams 3, 5-9 is defined in the form of learning objectives, knowledge statements, and readings.

LEARNING OBJECTIVES set forth, usually in broad terms, what the candidate should be able to do in actual practice. Included in these learning objectives are certain ones that may not be possible to perform on an examination, such as complex simulations, but that the candidate would still be expected to explain in an examination setting.

KNOWLEDGE STATEMENTS identify some of the key terms, concepts and methods that are associated with each learning objective. These knowledge statements are not intended to represent an exhaustive list of topics that may be tested, but they are illustrative of the scope of each learning objective.

READINGS support the learning objectives. It is intended that the readings, in conjunction with the material on the lower numbered examinations, provide sufficient resources to allow the candidate to perform the learning objectives. Some readings are cited for more than one learning objective.

Thus, the learning objectives, knowledge statements, and readings complement each other. The learning objectives define the purpose, the knowledge statements illustrate more fully the intended scope of the learning objectives, and the readings provide the source material to achieve the learning objectives. Learning objectives should not be seen as independent units, but as building blocks for the understanding and integration of important competencies that the candidate will be able to demonstrate.

Note that the range of weights shown should be viewed as a guideline only. There is no intent that they be strictly adhered to on any given examination—the actual weight may fall outside the published range on any particular examination. The overall section weights should be viewed as having more significance than the individual learning objective weights. Over a number of years of examinations, absent changes, it is likely that the average of the weights for each individual overall section will be in the vicinity of the guideline weight. For the individual learning objective weights, such convergence is less likely. On a given examination, in which it is very possible that not every individual learning objective will be tested, there will be more divergence of guideline weights and actual weights. Questions on a given learning objective may be drawn from any of the listed readings, or a combination of the readings. There may be no questions from one or more readings on a particular exam.

After each set of learning objectives, the readings are listed in abbreviated form. It is suggested that the candidate cover the learning objectives and readings in the order listed. Complete text references are provided at the end of each exam section.

Key

L   May be purchased from the publisher or bookstore or borrowed from the CAS Library.

NEW   Indicates new or updated material or modified citation.

SK   Represents material included in the 2004 CAS Study Kit.

SKU   Represents material included in the 2004 CAS Study Kit and the 2004 Update to the 2003 Study Kit.

W   Represents material that is available at no charge under Web Notes in the "Admissions" section of the CAS Web Site at www.casact.org. (For those without access to the Internet, printed copies of the Web Notes are available for a fee.)

Information for ordering Study Kits, Web Notes, and sample examinations, is available in the Study Resources section of this *Syllabus* beginning on page 26. A detailed identification of the text references

may be found at the end of each exam section of the *Syllabus*. The suggested reading material is designed to acquaint candidates with the respective subjects and should not be interpreted as representing views endorsed by the CAS. Although the CAS Library has many of the *Syllabus* readings available for loan (citations indicated with a bold **L**), some must be obtained by contacting the organizations listed in the "Publishers and Distributors" section. (Some booksellers may not indicate the official copyright date of a specific edition. Please use the edition number as a guide.) Information about using the CAS Library is found on page 28.

If a new edition of any text becomes available after publication of this *Syllabus*, candidates should check "*Syllabus* Update" in the "Admissions" section of the CAS Web Site or contact the CAS Office for instructions regarding its acceptability and the appropriate chapters or pages in the new edition that correspond to the published study requirements.

Associateship Examinations

Exam 1
Mathematical Foundations of Actuarial Science

This four-hour, multiple-choice examination is administered by Preliminary Actuarial Examinations and is identical to SOA Course 1. Information about Study Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site (www.casact.org) for any changes to the *Syllabus*.

The purpose of this examination is to develop a knowledge of the fundamental mathematical tools for quantitatively assessing risk. The application of these tools to problems encountered in actuarial science is emphasized. A thorough command of calculus and probability topics is assumed.

The tools emphasized on Exam 1 are:
- Limits, series, sequences, and functions
- Derivatives of single and multivariate functions (maximums, minimums, constrained maximums and minimums, rate of change)
- Integrals of single and multivariate functions, simple differential equations
- Parameterized curves
- General probability (set functions, basic axioms, independence)
- Bayes' Theorem
- Univariate probability distributions (probabilities, moments, variance, mode, percentiles, transformations)
- Multivariate probability distributions (Central Limit Theorem; joint, conditional and marginal distributions—probabilities, moments, variance, covariance)

A table of values for the normal distribution will be included with the examination booklet.

READINGS

The texts listed in Sections A and B below are considered representative of the many texts used by colleges and universities in Canada and the United States to cover material on which the candidate may be examined. Earlier or later editions of the listed texts contain essentially the same material and should be adequate for review purposes. The candidate may use any of these texts or others to review the material that will be examined.

The candidate is expected to be familiar with the concepts introduced in the Study Note in Section C.

A. Calculus

Anton, H.; Bivens, I.; and Davis, S., *Calculus, Late Transcendentals Combined Version* (Seventh Edition), 2001, John Wiley and Sons.

Edwards, C.H.; and Penney, D.E., *Calculus with Analytic Geometry* (Sixth Edition), 2002, Prentice-Hall.

Finney, R.L.; Demana, F.D.; and Waits, B.K., *Calculus: Graphic, Numerical, and Algebraic*, 1999, Addison-Wesley.

Larson, R.E.; Hostetler, R.P.; and Edwards, B.H., *Calculus* (Seventh Edition), 2002, Houghton Mifflin Company.

Stewart, J., *Calculus: Concepts and Contexts* (Second Edition), 2001, Brooks/Cole Publishing Company.

B. Probability

Bean, M.A., *Probability: The Science of Uncertainty with Applications to Investments, Insurance, and Engineering*, 2001, Brooks/Cole Publishing Company, Chapters 1-9.

Ghahramani, S., *Fundamentals of Probability* (Second Edition), 1999, Prentice-Hall, Chapters 1-10.

Hassett, M.; and Stewart, D., *Probability for Risk Management*, 1999, ACTEX Publications, Chapters 1-11.

Hogg, R.V.; and Tanis, E.A., *Probability and Statistical Inference* (Sixth Edition), 2001, Prentice-Hall, Chapters 1-6.

Ross, S.M., *A First Course in Probability* (Sixth Edition), 2001, Prentice-Hall, Chapters 1-8.

C. Risk and Insurance

"Risk and Insurance," Society of Actuaries Study Note 1-21-00.

Publishers and Distributors

Contact information is furnished for those who wish to purchase the text references cited for Exam 1. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

ACTEX Publications (Mad River Books), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com.

Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

Anton, H.; Bivens, I.; and Davis, S., *Calculus, Late Transcendentals Combined Version* (Seventh Edition), 2001, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

Bean, M.A., *Probability: The Science of Uncertainty with Applications to Investments, Insurance, and Engineering*, 2001, Brooks/Cole Publishing Company, a division of Thomson Learning, Order Department, 7625 Empire Drive, Florence, KY 41042; telephone: (800) 354-9706; Web site: http://training.thomsonlearning.com.

Edwards, C.H.; and Penney, D.E., *Calculus with Analytic Geometry* (Sixth Edition), 2002, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.

Finney, R.L.; Demana, F.D.; and Waits, B.K., *Calculus: Graphic, Numerical, and Algebraic*, 1999, Addison-Wesley; telephone: (800) 922-0579.

Ghahramani, S., *Fundamentals of Probability* (Second Edition), 1999, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.

Hassett, M.; and Stewart, D., *Probability for Risk Management*, 1999, ACTEX Publications, 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com.

Hogg, R.V.; and Tanis, E.A., *Probability and Statistical Inference* (Sixth Edition), 2001, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.

Larson, R.E.; Hostetler, R.P.; and Edwards, B.H., *Calculus* (Seventh Edition), 2002, Houghton Mifflin Company, Customer Service, 181 Ballardvale Street, Wilmington, MA 01887; telephone: (800) 225-1464; fax: (978) 661-1326.

"Risk and Insurance" (SN 1-21-00), Society of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.

Ross, S.M., *A First Course in Probability* (Sixth Edition), 2001, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.

SlideRule Books, 10 First Avenue East, Mobridge, SD 57601; telephone: (877) 407-5433 or (605) 845-5580; fax: (877) 417-5433 or (605) 845-7627; Web site: www.sliderulebooks.com.

Stewart, J., *Calculus: Concepts and Contexts* (Second Edition), 2001, Brooks/Cole Publishing Company, a division of Thomson Learning, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.

Exam 2
Interest Theory, Economics, and Finance

This four-hour, multiple-choice examination is administered by Preliminary Actuarial Examinations and is identical to SOA Course 2. Information about Study Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site (www.casact.org) for any changes to the *Syllabus*.

The purpose of this examination is to test the candidate's basic knowledge of economics and finance. Concepts from microeconomics and macroeconomics are fundamental to understanding the general business environment. Basic interest theory and finance are essential to understanding the business of insurance. A basic knowledge of calculus and probability is assumed.

LEARNING OBJECTIVES

A. Economics
  1. Microeconomics
     a. Candidates should be able to use the following microeconomic principles to build models to increase their understanding of the framework of contingent events and to use as a frame for activities such as pricing:
        - The shape of the Demand Curve, demand versus quantity demanded, changes in demand, and market demand
        - The supply versus quantity supplied equilibrium and the point of equilibrium and changes in the equilibrium point
        - Tastes, indifference curves, and the Marginal Rate of Substitution
        - Changes in income and the budget line, the Engel Curve
        - Changes in price and changes in the budget line, the Demand Curve
        - Income and substitution effects, the Compensated Demand Curve, why Demand Curves slope downward
        - Decisions under uncertainty such as the following: attitudes toward risk, and the theory of rational expectations
        - Adverse selection and moral hazard
     b. Candidates should be able to use knowledge of the following microeconomic principles to increase their understanding of the markets in which we operate and of the regulatory issues. Candidates should also be able to use the following microeconomic principles to increase their understanding of the ramification of strategic decisions:
        - The competitive firm, the competitive industry in the short run, revenue, costs and supply, elasticity of supply, and competitive equilibrium
        - The competitive firm, the competitive industry in the long run, long-run costs, supply, profits, constant/decreasing-cost industries, and equilibrium
        - Sources of monopoly power: natural, patents, resources, and legal barriers
        - Oligopoly, contestable markets, a fixed number of firms
        - Collusion, game theory, the prisoner's dilemma and the breakdown of cartels
        - Monopolistic competition, product differentiation and the economics of location
        - Consumers' and producers' surplus economics, theories of value
        - Adverse selection and moral hazard
  2. Macroeconomics
     a. Candidates should understand the following macroeconomic principles and use them in developing economic models and/or economic assumptions:
        - The general accounting conventions and data sources used in tracking economic activity

- The simplified Keynesian model, without adjustments for changes in price level or money supply, as it applies to changes in GDP caused by changes in investment, government spending, and net exports
- The relationship among interest rates, demand for money, consumption and investment using concepts such as the IS/LM curve, fiscal and monetary policy, and how foreign exchange rates affect GDP/NI
- The instruments and processes that shape the money supply including the money multiplier and the role of central banks, and their impact on inflation

    b. Candidates should understand the following macroeconomic principles and how they relate to the business cycle:
- The general accounting conventions and data sources used to track economic activity
- The simplified Keynesian Model, without adjustments for changes in price level or money supply, as it applies to changes in GDP caused by changes in investment, government spending, and net exports
- The relationship of price level, money demand, total demand, and total supply under the Keynesian Model

B. Interest Theory and Finance
  1. Interest Theory
    a. Candidates should have a practical knowledge of the theory of interest in both finite and continuous time. That knowledge should include how these concepts are used in the various annuity functions, and apply the concepts of present and accumulated value for various streams of cash flows as a basis for future use in reserving, valuation, pricing, duration, asset/liability management, investment income, capital budgeting, and contingencies. Candidates should be able to perform present and accumulated value calculations using non-level interest rates.
    b. Candidates should understand the following principles and applications of interest theory:
- Accumulation function and the special cases of simple and compound interest
- Nominal and effective interest and discount rates, and the force of interest—constant and varying
- Valuation of discrete and continuous streams of payments, including the case in which the interest conversion period differs from the payment period
- Determination of yield rates on investments, both portfolio and investment year methods, and the time required to accumulate a given amount or repay a given loan amount
- Application of interest theory to amortization of lump sums, fixed income securities, depreciation, mortgages, etc.

    c. Candidates should be able to use annuity functions in a broad finance context.
  2. Finance
    a. Candidates should understand and be able to analyze financial statements including balance sheets, income statements, and statements of cash flow. Candidates should be able to calculate discounted cash flows, internal rate of return, present and future values of bonds, and apply the dividend growth model and price/earnings ratios concept to valuing stocks.
    b. Candidates must be able to assess financial performance using net present value and the payback, discounted payback models, internal rate of return, and profitability index models. Candidates should be able to analyze statements and identify what should be discounted, what other factors should be considered, and the possible interactions between models.
    c. Candidates should understand the trade-off between risk and return, the implications of the efficient market theory to the valuation of securities, and be able to perform the following:
- Apply measures of portfolio risk and analyze the effects of diversification, systematic and unsystematic risks. Calculate portfolio risk and analyze the impact of individual securities on portfolio risk
- Identify efficient portfolios and apply the CAPM to firm cost of capital measures

- Value cash flows and analyze the certainty equivalent versus risk-adjusted discount rates using assumptions for inflation, the term structure of interest rates, and default risk correctly in their calculations

d. Candidates should understand the following concepts and be able to use them to analyze financial structures:
  - Efficient markets and their effect on security prices
  - Capital structure and the impact of financial leverage and long- and short-term financing policies on capital structure
  - Sources of capital and the definitions of techniques for valuing basic options such as calls and puts

e. Candidates should understand and be able to analyze financial performance by evaluating financial statements and financial ratios such as leverage, liquidity, profitability, market value ratios and analysis of accounting return versus economic return.

f. Candidates should understand and be able to apply the basic principles of option pricing theory including:
  - Black-Scholes formula
  - Valuation of basic options

Note: Concepts, principles, and techniques needed for Exam 2 are covered in the references listed below. Candidates and educators may use other references, but candidates should be very familiar with the notation, terminology, and viewpoints espoused in the listed references.

A table of values for the normal distribution will be included with the examination booklet.

READINGS

A. Economics

Landsburg, S.E., *Price Theory and Applications* (Fifth Edition), 2002, International Thomson Publishing. Chapters: 1, Supply, Demand, and Equilibrium; 2, Prices, Costs and the Gains from Trade; 3, Behavior of Consumers; 4, Consumers in the Marketplace; 5, The Behavior of Firms; 7, Competition; 8, Welfare Economics and the Gains from Trade; 9, Knowledge and Information (9.3 only—Topics in the Economics of Information); 10, Monopoly; 11, Market Power, Collusion, and Oligopoly; and 14, Common Property and Public Goods.

W Wachtel, P., "Macroeconomics," Society of Actuaries Study Note 2-21-00 (Third or Fourth Printing, including the errata).

B. Interest Theory and Finance

Kellison, S., *Theory of Interest* (Second Edition) 1991, Irwin/McGraw-Hill, Chapters: 1, Measurement of Interest; 2, Solution of Problems in Interest; 3, Basic Annuities (excluding 3.6, 3.7, 3.8, 3.10); 4, More General Annuities (excluding 4.8); 5, Yield Rates (excluding 5.8-5.9); 6, Amortization Schedules and Sinking Funds (excluding 6.7, 6.8); 7, Bonds and Other Securities (7.3 and 7.4 only); and 8, Practical Applications (8.5-8.7 only).

Brealey, R.A.; and Myers, S.C., *Principles of Corporate Finance* (Seventh Edition), 2003, McGraw-Hill, Chapters: 1, Finance and the Financial Manager; 4, The Value of Common Stocks; 5, Why Net Present Value Leads to Better Investment Decisions than Other Criteria; 6, Making Investment Decisions with the Net Present Value Rule; 7, Introduction to Risk, Return, and the Opportunity Cost of Capital; 8, Risk and Return; 9, Capital Budgeting and Risk; 10, A Project is Not a Black Box; 11, Where Positive Net Present Values Come From; 12, Making Sure Managers Maximize NPV; 13, Corporate Financing and the Six Lessons of Market Efficiency; 14, An Overview of Corporate Financing; 15, How Corporations Issue Securities; 16, The Dividend Controversy; 17, Does Debt Policy Matter?; 18, How Much Should a Firm Borrow?; 19,

Financing and Valuation; 20, Understanding Options; 21, Valuing Options; 22, Real Options; and 29, Financial Analysis and Planning. [Candidates may also use the sixth edition, Chapters 1, 4-21, and 28.]

Publishers and Distributors

Contact information is furnished for those who wish to purchase the text references cited for Exam 2. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

ACTEX Publications (Mad River Books), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com.

Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

Brealey, R.A.; and Myers, S.C*., Principles of Corporate Finance* (Seventh Edition), 2003, McGraw-Hill, P.O. Box 182605, Columbus, OH 43218-2605; telephone: (800) 262-4729.

Kellison, S.G., *Theory of Interest*, 1991, Irwin/McGraw-Hill, P.O. Box 182605, Columbus, OH 43218-2605; telephone: (800) 262-4729.

Landsburg, S.E., *Price Theory and Applications* (Fifth Edition), 2002, International Thomson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.

SlideRule Books, 10 First Avenue East, Mobridge, SD 57601; telephone: (877) 407-5433 or (605) 845-5580; fax: (877) 417-5433 or (605) 845-7627; Web site: www.sliderulebooks.com.

Wachtel, P., "Macroeconomics," Study Note 2-21-00, Society of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.

Exam 3
Actuarial Models

Before commencing study for this four-hour, multiple-choice examination, candidates should read the introduction to "Materials for Study" on page 29 of this *Syllabus* for important information about learning objectives, knowledge statements, readings, and the range of weights. Items marked with a bold **w** are available at no charge under Web Notes in the "Admissions" section of the CAS Web Site (www.casact.org). Those without access to the Web may purchase a print version of the items marked with a **w**—the 2004 CAS Exam 3 Web Notes—from the CAS Office for a cost of $15. Information about Web Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site for any changes to the *Syllabus*.

The CAS will grant credit for CAS Exam 3 to those who successfully complete SOA Course 3 in the current education structure.

This examination develops the candidate's knowledge of the theoretical basis of actuarial models and the application of those models to insurance and other financial risks. A thorough knowledge of calculus, probability, and interest theory is assumed. Knowledge of risk management at the level of Exam 1 is also assumed.

The candidate will be required to understand, in an actuarial context, what is meant by the word "model," how and why models are used, and their advantages and their limitations. The candidate will be expected to understand what important results can be obtained from these models for the purpose of making business decisions, and what approaches can be used to determine these results.

A variety of tables will be provided to the candidate with the exam. Copies of the specific tables are available on the CAS Web Site under Web Notes. They include values for the standard normal distribution, illustrative life tables, and abridged inventories of discrete and continuous probability distributions. Since they will be included with the examination, candidates will not be allowed to bring copies of the tables into the examination room.

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam. A guessing adjustment will be used in scoring Exam 3.

A. Contingent Payment Models and Survival Models

Range of weight for Section A: 25-30 percent

Candidates should be able to work with discrete and continuous univariate probability distributions for failure time random variables. They will be expected to set up and solve equations in terms of life table functions, cumulative distribution functions, survival functions, probability density functions, and hazard functions (e.g., force of mortality), as appropriate. They should have similar facility with models of the joint distribution of two failure times (multiple lives) and the joint distribution of competing risks (multiple decrement). They should be able to formulate and apply stochastic and deterministic models for the present value of a set of future contingent cash flows under an assumed interest rate structure. Candidates also should be able to apply the equivalence principle, and other principles in the text, to associate a cost or pattern of (possibly contingent) costs with a set of future contingent cash flows.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Create stochastic and deterministic models for present value, with an assumed interest rate structure, of a set of future contingent cash flows. Range of weight: 3-7 percent	a. Deterministic interest rate structure b. Scheme for the amounts of the cash flows c. Probability distribution of the times of the cash flows d. Probability distribution of the present value of the set of cash flows

2. Calculate the effects of changes to the components of the model. Range of weight: 0-5 percent	a. Deterministic interest rate structure b. Scheme for the amounts of the cash flows c. Probability distribution of the times of the cash flows d. Probability distribution of the present value of the set of cash flows
3. Apply a principle to a present value model to associate a cost or pattern of costs (possibly contingent) with a set of future contingent cash flows. Range of weight: 3-7 percent	a. Principles include: equivalence, exponential, standard deviation, variance, and percentile b. Models include: present value models based on 4-6 below c. Applications include: insurance, health care, credit risk, environmental risk, consumer behavior (e.g., subscriptions), and warranties
4. For discrete and continuous univariate probability distributions for failure time random variables, develop expressions in terms of the life table functions, l_x, q_x, p_x, $_nq_x$, $_np_x$, and $_{m\|n}q_x$, for the cumulative distribution function, the survival function, the probability density function and the hazard function (force of mortality), and be able to: • Establish relations between the different functions • Develop expressions, including recursion relations, in terms of the functions for probabilities and moments associated with functions of failure time random variables, and calculate such quantities using simple failure time distributions • Express the impact of explanatory variables on a failure time distribution in terms of proportional hazards and accelerated failure time models Range of weight: 3-7 percent	a. Failure time random variables b. Life table functions c. Cumulative distribution functions d. Survival functions e. Probability density functions f. Hazard functions g. Relationships between the above variables in the above functions
5. Given the joint distribution of two failure times, be able to: • Calculate probabilities and moments associated with functions of these random variables • Characterize the distribution of the smaller failure time (the joint life status) and the larger failure time (the last survivor status) in terms of functions analogous to those in Learning Objective A4, as appropriate • Develop expressions, including recursion relations, for probabilities and moments of functions of the joint life status and the last survivor status, and express these in terms of the univariate	a. Joint distribution of failure times b. Probabilities and moments

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
functions in Learning Objective A4 in the case in which the two failure times are independent Range of weight: 3-7 percent	
6. Based on the joint distribution (pdf and cdf) of the time until failure and the cause of failure in the competing risk (multiple decrement) model, in terms of the functions $l_x^{(t)}$, $_tq_x^{(t)}$, $_tp_x^{(t)}$, $_td_x^{(t)}$, $_tm_x^{(t)}(t)$, be able to: • Establish relations between the functions • Given the joint distribution of the time of failure and the cause of failure, calculate probabilities and moments associated with functions of these random variables Range of weight: 3-7 percent	a. Time until failure b. Competing risk (multiple decrement) models
READINGS	
Bowers et al.	

B. Frequency and Severity Models

Range of weight for Section B: 25-30 percent

Candidates should be able to define frequency (counting) and severity distributions, and be able to use the parameters and moments of these distributions. Candidates also should be able to work with the families of distributions generated by algebraic manipulation and mixing of the basic distributions presented.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. For the following counting distribution (frequency distribution): Poisson, mixed Poisson, negative binomial, binomial, and the (a,b,1) class of distributions, be able to: • Describe the how changes in the parameters values impact the distribution • Calculate their moments • Identify the applications for which these distributions are used and the reasons why they are used • Given the parameters of a distribution, apply the distribution to an application Range of weight: 8-12 percent	a. Applications of Frequency Distributions b. Parameters of Frequency Distribution c. Moments of Frequency Distributions

2. For the following families of loss (severity) distributions transformed beta, transformed gamma, inverse transformed gamma, lognormal and inverse Gaussian: • Describe how changes in the parameters values affect the distribution • Calculate their moments	a. Applications of Loss Distributions b. Parameters of Loss Distribution c. Moments of Loss Distributions d. Creation of new distributions

• Apply the following techniques for creating new families of distributions: multiplication by a constant, raising to a power, exponentiation, and mixing • Identify the applications in which these distributions are used and the reasons why they are used • Given the parameters of a distribution, apply the distribution to an application Range of weight: 8-12 percent	
3. Be able to interpret and produce graphical representations of loss and counting distributions. Be able to identify graphical presentations of loss that are: • Eliminated by a deductible • Covered under an insurance contract • Excess of the coverage provided by an insurance contract Range of weight: 3-7 percent	a. Lee diagrams
READINGS	
Klugman SN Klugman et al. 1 Lee	

C. Compound Distribution Models

Range of weight for Section C: 5-10 percent

Candidates should be able to calculate the probabilities associated with a compound distribution when the compounding distribution is one of the frequency distributions presented in the syllabus, and the compounded distribution is discrete or a discretization of a continuous distribution. Candidates also should be able to adjust such probability calculations for the impact of policy modifications such as deductibles, policy limits, and coinsurance.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe a compound distribution. Range of weight: 0-5 percent	a. Compound distributions
2. Calculate probabilities associated with a compound distribution when the compounding distribution is a member of the families in Learning Objective B1, and the compounded distribution is discrete or a discretization of a continuous distribution. Range of weight: 0-5 percent	a. Probabilities implied by compound distributions

3. Adjust the calculations described in Learning Objective C2 for the impact of policy modifications such as deductibles, policy limits and coinsurance.	a. Impact of deductible, policy limits and coinsurance	
Range of weight: 0-5 percent		
READINGS		
Klugman et al. 2		

D. Stochastic Process Models

Range of weight for Section D: 20-25 percent

Candidates should learn to solve problems using stochastic processes. They also should learn how to determine the probabilities and distributions associated with these processes.

The following stochastic processes will be covered: Markov chain (discrete-time and continuous-time) processes, counting processes, Poisson process (including nonhomogeneous and compound Poisson processes), and Brownian motion.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. For stochastic process, describe a process and be able to distinguish between discrete-time and continuous-time processes. Range of weight: 3-7 percent	a. Stochastic process b. Discrete time process c. Continuous time process
2. Describe a discrete-time Markov chain in terms of the transition probability matrix. • Use the Chapman-Kolmogorov equations to obtain probabilities associated with a discrete-time Markov chain. • Classify the states of a discrete-time Markov chain. • Calculate the limiting probabilities of a discrete-time Markov chain. Range of weight: 3-7 percent	a. Markov chains b. Transition probability matrix c. Discrete-time Markov chains
3. Describe a counting process. Range of weight: 0-5 percent	a. Counting process
4. For a Poisson process be able to calculate: • The distribution of the waiting times between events • The distribution of the process increments • The behavior of the process over an infinitesimal time interval Range of weight: 0-5 percent	a. Poisson process
5. Describe a nonhomogeneous Poisson process. For this process, be able to calculate probabilities associated with numbers of events and time periods of interest. Range of weight: 0-5 percent	a. Nonhomogeneous Poisson process b. Probability calculations for Nonhomogeneous Poisson process

6. For a compound Poisson process:
  • Calculate moments associated with the value of the process at a given time
  • Describe the value of the process at a given time as a compound Poisson random variable
Range of weight: 0-5 percent
	a. Compound Poisson process

7. Describe a Brownian motion process and be able to:
  • Determine the distribution of the value of the process at any time
  • Determine the distribution of a hitting time
  • Calculate the probability that one hitting time will be smaller than another
  • Describe a Brownian motion process with drift and a geometric Brownian motion process
Range of weight: 0-5 percent
	a. Brownian motion process
	b. Hitting times
	c. Brownian motion process with drift
	d. Geometric Brownian motion process

READINGS	
Ross 1	

E. Ruin Models

Range of weight for Section E: 5-10 percent

Candidates should be able to analyze the probability of ruin using various models. Other topics covered in this section include the determination of the characteristics of the distribution of the amount of surplus (deficit) at the first time below the initial level and the impact of reinsurance. (Knowledge regarding reinsurance terminology is not assumed. Cash flows from reinsurance will be determinable based on the description of the reinsurance provided on the examination.)

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS

1. For a ruin model:
  • Describe the considerations included in a ruin model
  • Calculate ruin probabilities for discrete time surplus processes
Range of weight: 5-10 percent
	a. Ruin models

READINGS	
Klugman et al. 3	

F. Simulation Modeling

Range of weight for Section F: 5-10 percent

Candidates should be able to generate discrete and continuous random variables using basic simulation methods. They also should be able to construct algorithms to simulate outcomes using stochastic models.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Generate discrete and continuous random variables using basic simulation methods. Range of weight: 3-7 percent	a. Simulation basics b. Applications to generate values of discrete and continuous random variables
2. Construct an algorithm to appropriately simulate outcomes under a wide variety of stochastic models. Range of weight: 0-5 percent	a. Simulation algorithms
READINGS	
Ross 2	

Complete Text References for Exam 3

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objectives	Source
Bowers, N.L.; Gerber, H.U.; Hickman, J.C.; Jones, D.A.; and Nesbitt, C.J., *Actuarial Mathematics* (Second Edition), 1997, Society of Actuaries, Chapter 3 (excluding 3.6), Sections 4.1-4.3, 5.1-5.3, 6.1-6.3, 7.1-7.4, 9.1-9.5, 9.7, 10.1-10.3.	Bowers et al.	A1-A6	**L**
Klugman, S.A., "Course/Exam 3 Study Note Replacing Chapter 2 Material from Loss Models," Fourth Printing, December 2003.	Klugman SN	B1-B3	**W**
Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 1.3, 3.1, 3.2.1-3.2.2, 3.3.1-3.3.2, 3.4.1, 3.5 (through first full paragraph on p. 222), 3.7 (excluding Examples 3.15, Theorem 3.4, Example 3.18 and following), 3.10.1 (excluding Example 3.34 and following), 3.10.2 (excluding Example 3.38 and following). [Some notation used in *Loss Models: From Data to Decisions* is introduced in Section 3.6.1. The candidate may find it helpful to refer to Section 3.6.1 when studying the later sections of the text.]	Klugman et al. 1	B1-B3	**L**
Klugman et al., *Loss Models: From Data to Decisions*, 1998, Sections 1.4, 4.1-4.3, 4.5, 4.6 (excluding Theorem 4.4 and Sections 4.6.2-4.6.5), 4.8.	Klugman et al. 2	C1-C3	**L**
Klugman et al., *Loss Models: From Data to Decisions*, 1998, Sections 6.2.3, 6.3.1, 6.3.2.1.	Klugman et al. 3	E	**L**
Lee, Y.S., "The Mathematics of Excess of Loss Coverages and Retrospective Rating—A Graphical Approach," Section 1, *PCAS* LXXV, 1988, pp. 49-54.	Lee	B1-B3	**W**
Ross, S.M., *Introduction to Probability Models* (Eighth Edition), 2003, Academic Press, San Diego, Sections 2.8, 4.1-4.4, 4.5.1, 4.6, 5.3-5.4 (excluding 5.4.3), 10.1-10.3. [Candidates may also use the seventh edition with the following citation: Sections 2.8, 4.1-4.4, 4.5.1, 4.6, 5.3-5.4, 10.1-10.3.]	Ross 1	D1-D7	**L**

Citation	Abbreviation	Learning Objectives	Source
Ross, S.M., *Simulation* (Third Edition), 2002, Academic Press, San Diego, Sections 3.1, 4.1-4.3, Chapter 5 (excluding 5.3 and 5.5). [Candidates may also use the Second Edition, 1997. The same chapter and section references apply.]	Ross 2	F1-F2	**L**

Key

L   May be purchased from the publisher or bookstore or borrowed from the CAS Library.

NEW   Indicates new or updated material or modified citation.

W   Represents material that is available at no charge from the "Admissions" section of CAS Web Site (www.casact.org) under Syllabus Web Notes. (For those without access to the Internet, printed copies of the Web Notes are available for a fee.)

Publishers and Distributors

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ACTEX Publications, 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; Web site: www.actexmadriver.com; e-mail: retail@actexmadriver.com.

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Bowers, N.L.; Gerber, H.U.; Hickman, J.C.; Jones, D.A.; and Nesbitt, C.J., *Actuarial Mathematics* (Second Edition), 1997, Society of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com.

Ross, S.M., *Introduction to Probability Models* (Eighth Edition), 2003, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.

Ross, S.M., *Simulation* (Third Edition), 2002, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.

SlideRule Books, 10 First Avenue East, Mobridge, SD 57601; telephone: (877) 407-5433 or (605) 845-5580; fax: (877) 417-5433 or (605) 845-7627; Web site: www.sliderulebooks.com.

Exam 4
Actuarial Modeling

This four-hour, multiple-choice examination is administered by Preliminary Actuarial Examinations and is identical to SOA Course 4. Information about Study Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site (www.casact.org) for any changes to the *Syllabus*.

This examination provides an introduction to modeling and covers important actuarial and statistical methods that are useful in modeling. A thorough knowledge of calculus, linear algebra, probability, and mathematical statistics is assumed. The candidate will be required to understand the steps involved in the modeling process and how to carry out these steps in solving business problems. The candidate should be able to: 1) analyze data from an application in a business context; 2) determine a suitable model including parameter values; and 3) provide measures of confidence for decisions based upon the model. The candidate will be introduced to a variety of tools for the calibration and evaluation of the models on Exam 3.

A variety of tables will be provided to the candidate in the Study Note Package and in the examination booklet. These include values for the standard normal distribution, chi-square distribution, *t* distribution, *F* distribution, and abridged inventories of discrete and continuous probability distributions. These tables are also available on the CAS and SOA Web Sites. Since they will be included with the examination, candidates will not be allowed to bring copies of the tables into the examination room.

LEARNING OBJECTIVES

Understanding Actuarial Models

The candidate is expected to apply statistical methods to sample data to quantify and evaluate the models presented on Exam 3 and to use the models to solve problems set in a business context. The effects of regulations, laws, accounting practices, and competition on the results produced by these models are not considered in this exam.

The candidate is expected to be able to perform the tasks listed below.

1. Identify the steps in the modeling process and discuss how they interrelate.

2. Identify the models and methods available, and understand the difference between the models and the methods.

3. Explain the difference between a stochastic and a deterministic model and identify the advantages and disadvantages of each.

4. Discuss the possible limitations imposed by the data available for input for constructing a model.

5. Understand that all models presented in Exams 3 and 4 are closely related. Apply models from more than one family (e.g., regression, stochastic process, time series) to a particular business application.

6. Identify the underlying assumptions implicit in each family of models and recognize which set(s) of assumptions are applicable to a given business application.

7. Estimate the parameters of a tabular failure time or loss distribution when the data is complete, or when it is incomplete, using maximum likelihood, method of moments, and Bayesian estimation.

8. Obtain nonparametric estimates for a failure time or loss distribution using the empirical distribution, the Kaplan-Meier estimator, and the Nelson-Aalen estimator.

9. Construct the likelihood model needed to estimate the parameters of a parametric failure time or loss distribution regression model.

10. Construct the partial likelihood model needed to estimate the regression coefficients in a semiparametric failure time or loss distribution regression model.

11. Adjust an estimation based on the presentation of the sample data—complete, incomplete, censored, truncated, grouped, shifted.

12. Apply statistical tests to determine the acceptability of a fitted model:
    - Pearson's chi-square statistic
    - Likelihood ratio test
    - Kolmogorov-Smirnov statistic

13. For estimators, define the terms: efficiency, bias, consistency, and mean squared error.

14. Calculate the least squares estimates of the parameters used in single and multiple linear regression models, and use knowledge of their distributions for hypothesis testing and development of confidence intervals.

15. Test a given linear regression model's fit to a given data set.

16. Assess the appropriateness of the linear regression model for a given data set by checking for such irregularities as heteroscedasticity, serial correlation, and multicollinearity.

17. Develop deterministic forecasts from time series data, using simple extrapolation and moving average models, applying smoothing techniques and seasonal adjustment when appropriate.

18. Use the concept of the autocorrelation function of a stochastic process to test the process for stationarity.

19. Generate a forecast using the general ARIMA model and develop confidence intervals for the forecast.

20. Test the hypothesis that a given stochastic process is a random walk.

21. For an ARIMA process (including simpler models as special cases), estimate the model parameters, and perform appropriate diagnostic checks of the model.

22. Apply limited fluctuation (classical) credibility including criteria for both full and partial credibility.

23. Perform Bayesian analysis using discrete and continuous examples.

24. Apply the Buhlmann-Straub credibility model to basic situations. Understand the relationship to the Bayesian model.

25. Apply the conjugate prior in Bayesian analysis and Buhlmann-Straub credibility, and, in particular, to the Poisson-gamma model.

26. Apply empirical Bayesian methods in the nonparametric and semiparametric cases.

27. Compare and contrast the assumptions underlying limited fluctuation credibility, Bayesian analysis, and the Buhlmann-Straub credibility model.

28. Determine an appropriate number of simulations to perform in order to estimate a quantity of interest.

29. Quantify the variability of an estimate in the context of simulation.

30. Determine the bootstrap estimates of the mean squared error of an estimator.

31. Use basic simulation methods to validate a model.

Applications of Actuarial Models

The candidate is expected to apply the models presented in Exam 3 and the statistical methods presented on this exam to business applications. As discussed above, the candidate should be able to take data from a given application and determine a suitable model, including parameter estimates, for use in making

business decisions related to the application. The candidate should be able to assess the variability of the parameter estimates and the goodness of fit of the model, and therefore provide an opinion on the confidence that should be given to the model output in making decisions. Relevant business applications include, but are not limited to:

- Premium (rate) for life insurance and annuity contracts
- Premium (rate) for accident and health insurance contracts
- Premium (rate) for casualty (liability) insurance contracts
- Premium (rate) for property insurance contracts
- Rates for coverages under group benefit plans
- Loss reserves for insurance contracts
- Benefit reserves for insurance contracts
- Resident fees for Continuing Care Retirement Communities (CCRCs)
- Cost of a warranty for manufactured goods
- Value of a financial instrument such as: a loan, a stock, an option, etc.
- Risk classification

Note: Concepts, principles, and techniques needed for Exam 4 are covered in the references listed below. Candidates and professional educators may use other references, but candidates should be very familiar with the notation and terminology used in the listed references.

A. The Modeling Process

Candidates should be able to identify steps in the modeling process as well as understand specific methods, models, underlying assumptions, and limitations imposed by the data.

READINGS

Background reading: Jones, B.L., "Actuarial Models and Modeling: An Interactive Approach" (CD-ROM), 2000, ACTEX Publications. (This reference is not required but may be a valuable tool to explore actuarial models and modeling techniques relevant to this exam.)

B. Estimation and Fitting of Models

Candidates should be able to construct models and estimate model parameters using the models and methods contained in the readings. Sample data used for estimation may be complete, incomplete, censored, truncated, grouped, or shifted. Ability to apply tests to determine the acceptability of a model will also be required.

READINGS

Klugman, S.A., "Estimation, Evaluation, and Selection of Actuarial Models," Study Note, Third Printing, December 2003. [Available in the "Admissions" section of the CAS Web Site under Web Notes or as SOA Study Note 4-23-03.]

C. Regression, Forecasting, and Time Series

Candidates should be able to understand the basics of regression analysis, time series analysis, and forecasting. Candidates will be required to estimate model parameters, perform various tests of the model to determine its acceptability, and generate forecasts using the model (with a confidence interval).

READINGS

Pindyck, R.S.; and Rubinfeld, D.L., *Econometric Models and Economic Forecasts* (Fourth Edition), 1998, Irwin McGraw-Hill, Boston, Chapters 3-6, 15-18.

D. Credibility Theory

Candidates should have a thorough understanding of credibility theory and concepts contained in the readings. Knowledge of limited fluctuation credibility, Bayesian and empirical Bayesian methods, Bulhmann and Buhlmann-Straub credibility is required.

BACKGROUND READINGS

Before commencing formal study of the material in this section, candidates should read the following for an introduction to the basic ideas underlying credibility theory:

W   Philbrick, S.W., "An Examination of Credibility Concepts," *PCAS* LXVIII, 1981, pp. 195-212.

    Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 1.5 and 5.1.

W   Mahler, H.C.; and Dean, C.G., "Credibility," *Foundations of Casualty Actuarial Science* (Fourth Edition), 2001, Casualty Actuarial Society, Chapter 8, Section 1 [Available in the "Admissions" section of the CAS Web Site under Web Notes or as SOA Study Note 4-21-01.]

    In addition, Section 5.2 of *Loss Models: From Data to Decisions* by Klugman, Panjer, and Willmot contains a review of basic statistical concepts that some candidates may find useful.

READINGS

W   Mahler, H.C.; and Dean, C.G., "Credibility," *Foundations of Casualty Actuarial Science* (Fourth Edition), 2001, Casualty Actuarial Society, Chapter 8, Section 2. [Available on the CAS Web Site under Web Notes or as SOA Study Note 4-21-01.]

The candidate may use either course of reading (Option 1 or Option 2) listed below for the remainder of the credibility material. The candidate will not be tested on the details of derivations in either course of reading.

Option 1

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 5.4 and 5.5 (excluding 5.4.6 and 5.5.3).

Option 2

W   Mahler, H.C.; and Dean, C.G., "Credibility," *Foundations of Casualty Actuarial Science* (Fourth Edition), 2001, Casualty Actuarial Society, Chapter 8, Sections 3-5; and

    Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 5.4.4. and 5.5 (excluding 5.5.3).

E. Simulation in Estimation and Fitting

Candidates should be able to apply simulation methods as presented in the readings to areas such as estimating a quantity, determining an estimate's variability, and validating a model.

READINGS

Ross, S.M., *Simulation* (Third Edition), 2002, Academic Press, San Diego, Chapters 7 and 9 (excluding 9.4). [Candidates may also use the Second Edition, 1997. The same chapter and section references apply.]

Publishers and Distributors

Contact information is furnished for those who wish to purchase the text references cited for Exam 4. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

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Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

Casualty Actuarial Society, *Foundations of Casualty Actuarial Science* (Fourth Edition), 2001, Casualty Actuarial Society, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

Pindyck, R.S.; and Rubinfeld, D.L., *Econometric Models and Economic Forecasts* (Fourth Edition), 1998, Irwin McGraw-Hill, P.O. Box 182605, Columbus, OH 43218-2605; telephone: (800) 262-4729.

Ross, S.M., *Simulation* (Third Edition), 2002, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.

SlideRule Books, 10 First Avenue East, Mobridge, SD 57601; telephone: (877) 407-5433 or (605) 845-5580; fax: (877) 417-5433 or (605) 845-7627; Web site: www.sliderulebooks.com.

Exam 5
Introduction to Property and Casualty Insurance and Ratemaking

Before commencing study for this four-hour examination, candidates should read the introduction to "Materials for Study" on page 29 of this *Syllabus* for important information about learning objectives, knowledge statements, readings, and the range of weights. Items marked with a bold **SK** or **SKU** constitute the 2004 CAS Exam 5 Study Kit that is available from the CAS Office for a cost of $37. Items marked with a bold **W** are available at no charge under Web Notes in the "Admissions" section of the CAS Web Site (www.casact.org). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2004 CAS Exam 5 Web Notes—from the CAS Office for a cost of $65. The 2004 Update to the 2003 Study Kit is available at a cost of $14 and includes only the items marked with a bold **SKU**. Information about Study Kits and Web Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site for any changes to the *Syllabus*.

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

A. Introduction to Property and Casualty Insurance

Range of weight for Section A: 15-20 percent

This section is for candidates to develop skills in reading and interpreting the policies they will be pricing or for which they will be developing reserves. The policies covered in the readings should be viewed as representative illustrations of broad categories of property and casualty policies. Candidates will be expected to understand the various parts of the policies, as well as be familiar with typical policy provisions, such as coverages, conditions, exclusions, limitations, duties, etc.

For purposes of this section, each of the following objectives refer to the following lines of business:
- Personal lines (auto, home)
- Commercial (auto, property, general liability, worker compensation, umbrella)

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the basic purpose and structure of the insurance contract, including coverages, exclusions, exceptions, limits, and deductibles. Range of weight: 9-13 percent	a. Possible exposure to loss: • Individual • Company • First party • Third party (legal liability and triggers; state mandated) • Perils covered b. Lines of insurance that cover each of the exposures to loss c. Basic insurance terminology (e.g., premium, loss, loss adjustment expense) d. Basic policy structure e. Basic policy terminology (e.g., named insured, declarations)

READINGS
Wiening and Malecki
Wiening et al.
Malecki and Flitner
Malecki et al.
Trupin and Flitner
ISO PAP

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Identify whether a loss is covered, under which policy/coverage it is covered, the amount of loss, and what portion of the loss is covered. Range of weight: 3-7 percent	a. Lines of insurance that cover each of the exposures to loss based on the contracts b. Coverage effective periods c. Loss versus loss expense d. Liability triggers

READINGS
Wiening et al.
Malecki and Flitner
Malecki et al.
Trupin and Flitner
ISO PAP

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Calculate a policy premium for a specified risk using the rate pages provided. Range of weight: 0-5 percent	a. Exposure basis and how this is determined b. How to read and use rate pages c. Rating variables (e.g., territory, driver characteristics) d. How individual risk attributes contribute to loss exposure e. How rating variables relate to exposure to loss

READINGS
ISO PAM

B. Insurance Operations

Range of weight for Section B: 10-15 percent

This section covers the operational aspects of insurance companies and several key areas are covered including company organization, marketing and distribution systems, underwriting, and claims.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS

1. Explain the functions of underwriting/marketing/claims adjusting within an insurance company.
 	
Range of weight: 3-8 percent
	a. Roles and responsibilities within an insurance company of:
	  • Underwriting
	  • Marketing
	  • Claims

READINGS
Webb et al.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Given specific actions by underwriting, marketing, and claims adjusting, explain the impact on rate adequacy and ratemaking. Range of weight: 0-5 percent	a. Components of ratemaking (premium, loss, expense) b. Losses c. New versus renewal business d. Mix of business and changes to it, e.g., adding youthful operators e. Claims, e.g., changes in opening and closing practices f. Outstanding claims versus new claims
READINGS	
McClenahan	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Explain how different distributional systems affect expenses. Range of weight: 0-5 percent	a. Distributional systems (brokers, independent agents, direct writers, exclusive agents) b. Expense calculations
READINGS	
Webb et al.	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Given specific external events or market conditions, explain the impact on insurance operations. Range of weight: 0-5 percent	a. Measurements of economics of insurance, including retention rate, new business b. Relationship of insurance and economic cycles c. Legal environment and how changes can affect exposure to loss d. Regulatory environment
READINGS	
Boor 2 Boor 3	

C. Specialized Lines of Business

Range of weight for Section C: 0-5 percent

This section is intended to give the candidates a high-level view of several additional types of insurance coverages that are not as common as those covered in Section A.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Define the key attributes associated with the following lines of business: • Medical malpractice • Professional liability • Health Weight 0-5 percent	a. Loss exposures and policy coverages
READINGS	
Malecki et al. Wiening et al. Bourdon	

D. Ratemaking

Range of weight for Section D: 35-40 percent

This section contains objectives covering ratemaking in broad, general principles, as well as specific detail. Candidates should have a thorough understanding of the basic principles of ratemaking, so that they can analyze data, select an appropriate technique, and develop a solution to a numerical problem. In addition, the candidate should be able to compare specific ratemaking techniques in terms of advantages and disadvantages as they are applied to specific situations and for different lines of business.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the role of exposure bases in the ratemaking process. Range of weight: 0-5 percent	a. Definition of exposure base b. Characteristics of exposure base c. Impact of exposure change d. Coverage provisions
READINGS	
McClenahan Finger CAS Principles Bouska Feldblum 2 Graves and Castillo Jones	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Use appropriate premium data to estimate premium input into the overall rate level indication, adjusting for the following: • Coverage and benefit level changes • Rate level changes • Premium trend Range of weight: 8-12 percent	a. Compilations of experience (Calendar Year/ Policy Year/Accident Year) b. Written versus earned premium c. Rate changes d. Policy terms e. Distributional shifts/changes in volumes (trend over time) f. Parallelogram method g. Extension of exposures h. Definition of exposures i. Impact of law changes
READINGS	
McClenahan Finger CAS Principles Feldblum 1 Feldblum 2 Jones ASOP 13	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Use appropriate loss and loss adjustment expense data to estimate loss and loss adjustment expense input into the overall rate level indication, adjusting for the following: • Coverage and benefit level changes • Loss trend • Loss development • Catastrophe provision Range of weight: 12-16 percent	a. Compilations of experience (Calendar Year/ Policy Year/Accident Year/Report Year) b. Incurred versus paid losses c. Loss development d. Relationship between trend and loss development e. Impact of law changes f. Frequency and its history (trend over time) g. Severity and its history (trend over time) h. Pure Premium and its history (trend over time) i. Changes in mix of business j. Exponential versus linear trend k. Adjustments for catastrophe l. Allocated versus unallocated loss adjustment expenses m. Credibility formulas n. Credibility criteria o. Policy provisions p. Large loss adjustment

READINGS
McClenahan Finger CAS Principles Boor 1 Burger et al. Feldblum 2 Graves and Castillo Marker and Mohl ASOP 13 Bourdon Krakowski

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Calculate the underwriting expense provisions for estimating an overall rate level indication. Range of weight: 0-5 percent	a. Expense categories: • Commission • General • Other acquisition • Tax, license, and fees b. Profit and contingency provisions c. Sources of data and selection criteria d. Fixed and variable expense e. Expense fee calculation f. Differences in procedures for loss adjustment expenses versus underwriting expenses

READINGS
McClenahan CAS Principles Feldblum 2 Graves and Castillo Schofield Brown and Schmitz

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Calculate an overall rate level indication using the pure premium and loss ratio methods. Range of weight: 5-10 percent	a. Loss ratio formula b. Pure premium formula c. Estimates of formula components
READINGS	
McClenahan Feldblum 2 Graves and Castillo	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Compare and contrast the loss ratio method and pure premium method in estimating an overall rate level indication. Range of weight: 0-5 percent	a. Loss Ratio method • Formula • Advantages/disadvantages • Assumptions and data needs b. Pure Premium method • Formula • Advantages/disadvantages • Assumptions and data needs
READINGS	
McClenahan CAS Principles	

E. Classification Analysis

Range of weight for Section E: 10-15 percent

This section deals with a number of ratemaking issues surrounding the proper classification of insureds for the purposes of risk stratification.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the purpose and methods for segregating data into homogeneous groups. Range of weight: 0-5 percent	a. Credibility b. Impact on insurance operations (e.g., underwriting) c. Adverse selection d. Criteria for selection of classification grouping e. Efficiency of class plan

READINGS
Webb et al.
CAS Principles
Bouska
Boor 1
Feldblum 2
Burger et al.
Lange
Finger

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Calculate rating factors/relativity for: • Classification • Territory • Deductibles • Increased limits Range of weight: 8-12 percent	a. Credibility/complements of credibility b. Off balance c. Capping of changes d. Layers of loss e. Loss elimination f. Basic versus total limits g. Expense adjustments h. Formulas/processes for each rating factor
READINGS	
CAS Principles Boor 1 Feldblum 1 Feldblum 2 Graves and Castillo Lange Brown and Schmitz Bourdon Finger	

F. Miscellaneous Ratemaking Topics

Range of weight for Section F: 15-20 percent

This section includes special topics related to ratemaking.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the purpose of co-insurance. Range of weight: 0-5 percent	a. Definition of co-insurance b. Insurance to Value concepts c. Layers of loss d. Coverage issues e. Co-insurance provisions
2. Calculate premium for policies with co-insurance provisions. Range of weight: 0-5 percent	a. Common policy provisions b. Formula and its components c. Layers of loss
READINGS	
Anderson Kelley	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Calculate a catastrophe provision. Range of weight: 0-5 percent	a. Definition of catastrophe b. Formula/process for estimating modeled and non-modeled catastrophes c. Definition of damage ratios d. Coverage terms
READINGS	
Krakowski Burger et al.	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Explain the impact of catastrophes on insurance company operations and ratemaking. Range of weight: 0-5 percent	a. Concentration of exposure b. Underwriting issues c. Reinsurance d. Loss adjustment issues e. Claim issues f. Risk and profit loads
READINGS	
Burger et al.	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Explain the use of statistical plans. Range of weight: 0-5 percent	a. Purpose of a statistical plan b. Components of a statistical plan c. Limitations of company and industry data
READINGS	
Prevosto Moncher	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Explain the purpose of individual risk rating. Range of weight: 0-5 percent	a. Experience modifications b. Schedule rating c. Credibility d. Manual rating e. Retrospective rating f. Experience period
READINGS	
CAS Principles Sherwood Tiller	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
7. Perform individual risk rating calculations. Range of weight: 0-5 percent	a. Formula for experience modification and components b. Layers of loss c. Credibility d. Manual rating

	READINGS
	Sherwood
	Tiller

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
8. Calculate insurance prices using asset share/cash flow techniques for estimating costs. Range of weight: 3-7 percent	a. Model characteristics and formulas b. Premium c. Loss characteristics (frequency, severity) d. Expenses e. Persistency rates f. Policy durations g. Termination rates
READINGS	
Feldblum 1	

Complete Text References for Exam 5

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice No. 13, Trending Procedures in Property/Casualty Insurance Ratemaking."	ASOP 13	D2, D3	**W**
Anderson, G., "Insurance to Value," CAS Study Note, 2003.	Anderson	F1, F2	**NEW, W**
Boor, J.A., "The Complement of Credibility," *PCAS* LXXXIII, 1996, pp. 1-40. Examination questions will not be based directly on Appendices A, B, and C, which were included in this Study Note for completeness.	Boor 1	D3, E1, E2	**W**
Boor, J.A., "The Impact of the Insurance Economic Cycle on Insurance Pricing," CAS Study Note, 1998.	Boor 2	B4	**W**
Boor, J.A., "A Macroeconomic View of the Insurance Marketplace," CAS Study Note, 1998.	Boor 3	B4	**W**
Bourdon, T.W.; Passwater, K.; and Priven, M., "An Introduction to Capitation and Health Care Provider Excess Insurance," *Health Care Issues for Property/Casualty Insurers*, Casualty Actuarial Society *Discussion Paper Program*, 1997, pp. 97-139, including erratum.	Bourdon	C, D3, E2	**W NEW**
Bouska, A.S., "Exposure Bases Revisited," *PCAS* LXXVI, 1989, pp. 1-23.	Bouska	D1, E1,	**W**
Brown, B.Z.; and Schmitz, M.C., "Study Note Reading on Deductibles," CAS Study Note, 1998.	Brown and Schmitz	D4, E2	**W**

Citation	Abbreviation	Learning Objective	Source
Burger, G.; Fitzgerald, B.; Woods, P.; and White, J., "Incorporating a Hurricane Model into Property Ratemaking," Study Note, omitting pp. 42-53. Examination questions will not be based directly on the Appendix and Glossary, which were included in this Study Note for completeness.	Burger et al.	D3, E1, F3, F4	**SK**
Casualty Actuarial Society Committee on Ratemaking Principles, *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, Casualty Actuarial Society.	CAS Principles	D1-4, D6, E1, E2, F6	**W**
Feldblum, S., "Personal Automobile Premiums: An Asset Share Pricing Approach for Property-Casualty Insurance," *PCAS* LXXXIII, 1996, pp. 190-256 (excluding Sections 7-9).	Feldblum 1	D2, E2, F8	**W**
Feldblum, S., "Workers' Compensation Ratemaking," CAS Study Note, September 1993. Examination questions will not be based directly on the appendices, which were included in this Study Note for completeness.	Feldblum 2	D1-5, E1, E2,	**W**
Finger, R.J., "Risk Classification," *Foundations of Casualty Actuarial Science* (Fourth Edition), Casualty Actuarial Society, 2001, Chapter 6, pp. 287-342.	Finger	D1-3, E1, E2	**W**
Graves, N.; and Castillo, R., "Commercial General Liability Insurance Ratemaking for Premises and Operations," *Pricing Issues*, Casualty Actuarial Society *Discussion Paper Program*, 1990, Volume II, pp. 631-696 (excluding section on Minimum Bias Procedures, pp. 673-681).	Graves and Castillo	D1, D3, D4, D5, E2	**W**
Insurance Services Office, Inc., Personal Automobile Manual (Effective 6-98), General Rules 1-6 only. The entire manual is included for completeness.	ISO PAM	A3	**SK**
Insurance Services Office, Inc., Personal Automobile Policy (Edition 6-98). A copy of the policy will be provided to candidates with the exam. Candidates are expected to know how to use the policy as a reference. Questions will assume that candidates have a thorough understanding of the policy prior to taking the exam, as they will not have time to familiarize themselves with the policy during the exam. This 12-page policy will be an exact reprint from the Study Kit. A candidate who is familiar with the structure of the policy should readily be able to find the pertinent sections.	ISO PAP	A1, A2	**SK**
Jones, B.D., "An Introduction to Premium Trend," CAS Study Note, 2002.	Jones	D1, D2	**W**
Kelley, R., "Homeowners Insurance to Value—An Update," Casualty Actuarial Society *Forum* including the Ratemaking Call Papers, 1994, pp. 529-562.	Kelley	F1, F2	**W**

Citation	Abbreviation	Learning Objective	Source
Krakowski, I., "Quantifying the Impact of Non-Modeled Catastrophes on Homeowners Experience," Casualty Actuarial Society *Forum*, Winter 2003, pp. 285-316, including errata.	Krakowski	D3, F3	**W NEW**
Lange, J.T., "The Interpretation of Liability Increased Limits Statistics," *PCAS* LVI, 1969, pp. 163-173.	Lange	E1, E2	**W**
Malecki, D.S.; and Flitner, A.L., *Commercial Liability Insurance and Risk Management* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1998, Volume 1, pp. 1-33, 71-123.	Malecki and Flitner	A1, A2	**SK**
Malecki, D.S.; Horn, R.C.; Wiening, E.A.; and Flitner, A.L., *Commercial Liability Insurance and Risk Management* (Third Edition), American Institute for Chartered Property Casualty Underwriters, 1996, Volume 2, pp. 1-60, 167-180.	Malecki et al.	A1, A2, C	**SK**
Marker, J.O.; and Mohl, J.J., "Rating Claims-Made Insurance Policies," *Pricing Property and Casualty Insurance Products*, Casualty Actuarial Society *Discussion Paper Program*, 1980, pp. 265-304. Including discussion of paper: McManus, M.F., pp. 305-322.	Marker and Mohl	D3	**W**
McClenahan, C.L., "Ratemaking," *Foundations of Casualty Actuarial Science* (Fourth Edition), Casualty Actuarial Society, 2001, Chapter 3, pp. 75-148.	McClenahan	B2, D1-6	**W**
Moncher, R.B., "Study Note: NCCI Data Collection Calls and Statistical Plans," CAS Study Note. Examination questions will not be taken from the history section that was included to emphasize the changing nature of data collection activities over time.	Moncher	F5	**W**
Prevosto, V.R., "Study Note: ISO Statistical Plans," CAS Study Note. Candidates will not responsible for the details of the Exhibits.	Prevosto	F5	**W**
Schofield, D., "Going From a Pure Premium to a Rate," CAS Study Note, 1998.	Schofield	D4	**W**
Sherwood, M.T., "Individual Risk Rating," *Foundations of Casualty Actuarial Science* (Fourth Edition), Casualty Actuarial Society, 2001, Chapter 4, pp. 149-195.	Sherwood	F6, F7	**W**
Tiller, M.W., "Individual Risk Rating," CAS Study Note.	Tiller	F6, F7	**W**
Trupin, J.; and Flitner, A.L., *Commercial Property Insurance and Risk Management* (Fifth Edition), American Institute for Chartered Property Casualty Underwriters, 1998, Volume 1, pp. 101-122.	Trupin and Flitner	A1, A2	**SK**

Citation	Abbreviation	Learning Objective	Source
Webb, B.L.; Harrison, C.M.; and Markham, J.J., *Insurance Operations and Regulation* (First Edition), American Institute for Chartered Property Casualty Underwriters, 2002, pp. 1.3-1.13, 3.3-3.34, 4.3-4.16, 5.3-5.26 (up to Underwriting Other Causes of Loss), 6.3-6.43 (up to Personal Liability Underwriting), 14.3-14.33 (up to Challenges Facing Specific Types of Property Claims), and 15.3-15.30 (up to Challenges Facing Specific Types of Liability Claims).	Webb et al.	B1, B3, E1	**SKU NEW**
Wiening, E.A.; and Malecki, D.S., *Insurance Contract Analysis* (First Edition), American Institute for Chartered Property Casualty Underwriters, 1992, pp. 4-30, 37-74, 83-91, and 373-382.	Wiening and Malecki	A1	**SK**
Wiening, E. A.; Rejda, G. E.; Luthardt, C. M.; and Ferguson, C. L., *Personal Insurance* (First Edition), American Institute for Chartered Property Casualty Underwriters, 2002, pp. 1.3-1.16, 3.3-3.31, 4.3-4.21, 5.3-5.41, 6.3-6.19 (up to Section II—Additional Coverages), and 12.5-12.27.	Wiening et al.	A1, A2, C	**L NEW**

Source Key

L   May be borrowed from the CAS Library.

NEW   Indicates new or updated material or modified citation.

SK   Represents material included in the 2004 CAS Study Kit.

SKU   Represents material included in the 2004 CAS Study Kit and the 2004 Update to the 2003 Study Kit.

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Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.

American Institute for Chartered Property Casualty Underwriters, Order Department, P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Casualty Actuarial Society *Forum*, *Foundations of Casualty Actuarial Science* (Fourth Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Insurance Services Office, Inc., 545 Washington Boulevard, Jersey City, NJ 07310-1686; telephone: (800) 888-4476.

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Exam 6
Reserving, Insurance Accounting Principles, and Reinsurance

Before commencing study for this four-hour examination, candidates should read the introduction to "Materials for Study" on page 29 of this *Syllabus* for important information about learning objectives, knowledge statements, readings, and the range of weights. Items marked with a bold **SK** constitute the 2004 CAS Exam 6 Study Kit that is available from the CAS Office for a cost of $20. Items marked with a bold **W** are available at no charge under Web Notes in the "Admissions" section of the CAS Web Site (www.casact.org). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2004 CAS Exam 6 Web Notes—from the CAS Office for a cost of $65. Information about Study Kits and Web Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site for any changes to the *Syllabus*.

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

A. Actuarial Reserves

Range of weight for Section A: 45-60 percent

This section introduces the various techniques used by the actuary in developing or reviewing actuarial reserves that may be established by an insurance entity or by a noninsurance entity that is retaining risk. The principles and standards of practice for reserving will be examined. This section also introduces the concepts of dynamic financial analysis to the candidate.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Calculate reserves using each of the following reserving methods: • Age-to-age • Bornhuetter-Ferguson • Frequency/severity models • Unearned premium reserve methods • Loss expense reserve methods • Reserve discounting methods Range of weight: 18-22 percent	a. Standards of Practice, ASOP No. 9 b. Statement of Principles, CAS c. Mechanics associated with each of the methods d. Loss and claims handling process e. Accounting basis of the data f. Application of credibility g. Terms: loss reserves, premium reserves, expense reserves, salvage and subrogation, GAAP reserves, SAP reserves, retrospective premium, IBNR, case reserves, gross and net of reinsurance exposure measures, ULAE, ALAE, DCC, AOE, pay-out pattern, reporting pattern

READINGS
Adler and Kline
ASB 9
Berquist and Sherman
Berry
Bornhuetter and Ferguson
Brosius
CAS
Fisher and Lange
Hayne
Johnson
Kittel
Mack

McKnight
Pinto and Gogol
Resony
Siewert
Teng and Perkins
Wiser et al.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Identify strengths and weaknesses of reserving methods for specific situations/data. Range of weight: 8-12 percent	a. Ways data are organized b. Advantages and disadvantages of various methods c. Terms: age of data, limits, line of business d. Fundamentals of different types of insurance: long-tailed versus short tailed, high frequency, low severity
READINGS	
Adler and Kline ASB 9 Berquist and Sherman Berry Bornhuetter and Ferguson Brosius CAS Fisher and Lange Fisher and Lester Hayne Johnson Kittel McKnight Pinto and Gogol Resony Siewert Stanard Teng and Perkins Wiser et al.	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS

3. Adjust data and/or projections for changes in:
  • Case reserve adequacy
  • Closure rates and insurance programs
  • Reinsurance programs
Note: focus on the ceding company's perspective.
Range of weight: 3-7 percent
	a. Accounting basis for the data, e.g., how claims are counted; how claims are grouped; claims-made versus occurrence
	b. Effect of subrogation and salvage on projections
	c. How reinsurance works

READINGS	
Berquist and Sherman Fisher and Lester	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Test result(s) of reserve analysis for adequacy/reasonableness. Range of weight: 5-10 percent	a. What an adequate reserve is b. Retrospective tests c. Prospective tests d. Credibility of reserves e. Reserve margin definition (confidence interval)

READINGS
Berquist and Sherman   Brosius   Fisher and Lange   Fisher and Lester   Wiser et al.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Assess the impact of operating changes on the reserve estimate. Range of weight: 3-7 percent	a. How operating changes affect reserve estimates • Underwriting and policy language • Marketing • Claims administration • Reinsurance • Deductibles

READINGS
ASB 9   Berquist and Sherman   Fisher and Lester

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Make specific provisions in the reserve estimate for emerging mass tort liabilities. Range of weight: 0-5 percent	a. What mass tort liabilities are emerging, e.g., mold, asbestos, pollution, lead paint b. Methods for estimating the reserves c. Differences between normal or traditional claim development and development of mass torts

READINGS
Bouska   Ollodart

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
7. Describe concepts of dynamic financial analysis. Range of weight: 0-5 percent	a. Components of financial statements b. Appropriate components to model • Interest rates • Reserves • Pricing • Losses • Assets

READINGS
DFA   CAS ERM

B. Insurance Accounting

Range of weight for Section B: 10-20 percent

This section presents the general concepts of insurance accounting to the candidate. The candidate should become familiar with insurance accounting terminology and practice. This includes differences between statutory and Generally Accepted Accounting Principles (GAAP) accounting, and the impact of reinsurance and reserves on financial statements.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the purposes and origins of accounting standards and regulations. Range of weight: 0-5 percent	a. Purpose of accounting b. Types of accounting c. Principal financial statements d. Sources of accounting rules e. Selected accounting concepts f. Common accounts for insurance companies g. The ways GAAP and SAP accounting can differ for a particular country (e.g., the United States)
READINGS	
Blanchard FAS 5 FAS 60 Marshall et al.	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Analyze balance sheet and income statement to determine financial performance of insurance companies. Range of weight: 3-7 percent	a. Definition and purpose of balance sheet b. Definition and purpose of income statement c. Relevant measures that define financial performance, e.g., profitability, liquidity, leverage, underwriting ratios
READINGS	
Balcarek IASA Marshall et al. Troxel and Bouchie	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Determine impact of reserve estimates and changes in reserve estimates on the balance sheet and income statement. Range of weight: 0-5 percent	a. Definition and purpose of balance sheet b. Definition and purpose of income statement c. Difference between actuarial and financial statement data (calendar year versus accident year) d. Relationship between target reserves and actuarial indications (margin)
READINGS	
Balcarek	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Determine impact of reinsurance program on balance sheet and income statement Range of weight: 0-5 percent	a. Definition and purpose of balance sheet b. Definition and purpose of income statement c. Characteristics and purpose of any given reinsurance program
READINGS	
IASA FAS 113 CAS VFIC	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Create a balance sheet and income statement given major account balances at various points in time. Range of weight: 0-5 percent	a. Formulas associated with each component of the balance sheet and income statement b. Assignment of items to assets, liabilities, receipts, and expenses according to GAAP and SAP
READINGS	
Marshall et al. Troxel and Bouchie	

C. Reinsurance

Range of weight for Section C: 30-40 percent

This section provides the candidate with information related to the sharing of risk between an insurer and reinsurer. It introduces the various types of reinsurance, its purposes and how it is marketed and underwritten. It also addresses how actuarial concepts such as pricing and reserving are adapted to apply to reinsurers.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the meaning of various reinsurance terms. Range of weight: 0-5 percent	a. XOL b. Quota share c. Surplus share d. Treaty e. Facultative f. Rate-on-line g. Subject earned premium h. Commutation i. Finite reinsurance j. Insurance capacity k. Clash l. Ceded, direct, gross, assumed, net m. Catastrophe treaty n. Aggregate excess of loss o. Burning costs
2. Explain the purposes of various reinsurance arrangements. Range of weight: 3-7 percent	a. Capacity b. Surplus relief c. Smoothing of results

READINGS
Cass et al.
Elliott et al. 1
Elliott et al. 2
IASA

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS

3. Determine the price of reinsurance programs using the appropriate methods.
 	
Range of weight: 3-7 percent
	a. Loss distributions
	b. Increased limit factors
	c. Trend
	d. Expenses
	e. Reinsurance pricing methods
	  • Burn cost
	  • Exposure method
	  • Experience rating

READINGS
Clark
Ludwig

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS

4. Measure the effects on reinsurance pricing of:
  • Sliding scale commissions
  • Reinstatement clauses
  • Loss corridors
  • Retrospective rating
  • Commutations
  • Clash
  • Catastrophe
 	
Range of weight: 3-7 percent
	a. Expenses
	b. Contract provisions e.g., risk attaching versus losses occurring
	c. Loss distributions
	d. Present value
	e. Fundamentals of retrospective rating

READINGS
Clark
Ludwig
Steeneck

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS

5. Calculate ceded losses when provided with gross losses using the provisions of the given reinsurance program.
 	
Range of weight: 3-7 percent
	a. How reinsurance contracts apply
	  • ALAE included or excluded
	  • Per occurrence limits
	  • Aggregate limits
	  • Order in which limits apply

READINGS
Cass et al.
Elliott et al. 1
Elliott et al. 2

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Compare and contrast reinsurance and primary reserving procedures. Range of weight: 0-5 percent	a. Reinsurance and primary reserving methods b. Impact on assumptions because of differences in information available to reinsurers c. Stanard-Buhlmann method

7. Adjust primary methods and data to be used for reinsurance reserving.
 	
Range of weight: 0-5 percent
	a. Reinsurance and primary reserving methods
	b. Impact on assumptions because of differences in information available to reinsurers
	c. Underlying business characteristics e.g., concentration of exposures
	d. Data structures:
	  • Ground up versus excess loss
	  • Accident year versus treaty year

8. Calculate ceded loss reserves using appropriate methods. Range of weight: 3-7 percent	a. Reinsurance reserving methods b. Adjustments in data (see above) c. Statement of Principles, CAS d. Standards of Practice, ASOP No. 9
READINGS	
Patrik	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
9. Measure the impact of reinsurance on financial statements (surplus relief). Range of weight: 0-5 percent	a. How surplus relief works b. Impact on unearned premium reserve c. Types of reinsurance that apply d. Leverage ratios (gross versus net) e. FAS 113 f. NAIC Accounting Handbook Chapter 22
READINGS	
FAS 113 CAS VFIC IASA	

Complete Text References for Exam 6

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
Actuarial Standards Board of American Academy of Actuaries, "Actuarial Standard of Practice No. 9, Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations (Doc. No. 027)," 1991. Excluding Appendices 1 and 3.	ASB 9	A1, A2, A5	**W**
Adler, M.; and Kline, C.D. Jr., "Evaluating Bodily Injury Liabilities Using a Claims Closure Model," *Evaluating Insurance Company Liabilities*, Casualty Actuarial Society *Discussion Paper Program*, 1988, pp. 1-66.	Adler and Kline	A1, A2	**W**

Citation	Abbreviation	Learning Objective	Source
Balcarek, R.J., "Effect of Loss Reserve Margins in Calendar Year Results," *PCAS* LIII, 1966, pp. 1-16. Including discussion of paper: Longley-Cook, L.H., *PCAS* LIII, 1966, pp. 17-18.	Balcarek	B2, B3	**W**
Berquist, J.R.; and Sherman, R.E., "Loss Reserve Adequacy Testing: A Comprehensive, Systematic Approach," *PCAS* LXIV, 1977, pp. 123-184. Including discussion of paper: Thorne, J.O., *PCAS* LXV, 1978, pp. 10-33.	Berquist and Sherman	A1, A2, A3, A4, A5	**W**
Berry, C.H., "A Method for Setting Retro Reserves," *PCAS* LXVII, 1980, pp. 226-238. Including discussion of paper: Morrell, R.K., *PCAS* LXVIII, 1981, pp. 107-110.	Berry	A1, A2	**W**
Blanchard, R.S., "Accounting Concepts for the Actuary," CAS Study Note, June 2003.	Blanchard	B1	**W NEW**
Bornhuetter, R.L.; and Ferguson, R.E., "The Actuary and IBNR," *PCAS* LIX, 1972, pp. 181-195. Including discussions of paper: Cooper, W.P., *PCAS* LX, 1973, pp. 161-164; and White, H.G., *PCAS* LX 1973, pp. 165-168.	Bornhuetter and Ferguson	A1, A2	**W**
Bouska, A.S., "From Disability Income to Mega-Risks: Policy-Event Based Loss Estimation," Casualty Actuarial Society *Forum*, Summer 1996, pp. 291-320.	Bouska	A6	**W**
Brosius, E., "Loss Development Using Credibility," CAS Study Note, March 1993.	Brosius	A1, A2, A4	**W**
Cass, R.M.; Kensicki, P.R.; Patrik, G.S.; and Reinarz, R.C., *Reinsurance Practices* (Second Edition), Insurance Institute of America, 1997, Volume 1, Chapter 5; Volume 2, Chapters 9, 10, and 11.	Cass et al.	C1, C2, C5	**L**
Casualty Actuarial Society Enterprise Risk Management Committee, "Overview of Enterprise Risk Management," Casualty Actuarial Society *Forum*, Summer 2003, Section 3 and Appendix B.	CAS ERM	A7	**W NEW**
Casualty Actuarial Society, *Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves*, May 1988.	CAS	A1, A2	**W**
Casualty Actuarial Society Valuation, Finance, and Investments Committee, "Accounting Rule Guidance Statement of Financial Accounting Standards No. ll3—Considerations in Risk Transfer Testing" Casualty Actuarial Society *Forum*, Fall 2002, pp. 305-338, excluding Section 7, Beyond VaR Tests.	CAS VFIC	B4, C9	**W NEW**
Clark, D.R., "Basics of Reinsurance Pricing," CAS Study Note, 1996.	Clark	C3, C4	**W**
Dynamic Financial Analysis Committee of the Casualty Actuarial Society, "Overview of Dynamic Financial Analysis," DFA Research Handbook, CAS Web Site (www.casact.org/research/dfa/dfahbch1.pdf), Chapter 1.	DFA	A7	**W**

Citation	Abbreviation	Learning Objective	Source
Elliott, M.W.; Webb, B.L.; Anderson, H.N.; and Kensicki, P.R., *Principles of Reinsurance* (Second Edition), Insurance Institute of America, 1995, Volume 1, Chapter 1, 2 (pp. 47-60), 3 (pp. 78-82), and 6.	Elliott et al. 1	C1, C2, C5	**L**
Elliott, M.W.; Webb, B.L.; Anderson, H.N.; and Kensicki, P.R., *Principles of Reinsurance* (Second Edition), Insurance Institute of America, 1995, Volume 2, pp. 107-113.	Elliott et al. 2	C1, C2, C5	**SK**
Financial Accounting Standards Board, "Statement of Financial Accounting Standards No. 5, Accounting for Contingencies," Paragraphs 1-4, 8-11, 15, 40-45.	FAS 5	B1	**SK**
Financial Accounting Standards Board, "Statement of Financial Accounting Standards No. 60, Accounting and Reporting by Insurance Enterprises," Paragraphs 1-9, 11, 13-14, 17-18, 20, 27-34, 38-41, 44, 60 a-h.	FAS 60	B1	**SK**
Financial Accounting Standards Board, "Statement of Financial Accounting Standards, No. 113, Accounting and Reporting for Reinsurance of Short-Duration and Long-Duration Contracts," December 1992, Summary, plus pp. 1-10 and 37-46. Appendices B and C are included as part of the formal reading from which questions may be taken. Candidates may find Appendix A helpful in preparing for this material; however, no questions will be taken directly from it.	FAS 113	B4, C9	**SK**
Fisher, W.H.; and Lange, J.T., "Loss Reserve Testing: A Report Year Approach," *PCAS* LX, 1973, pp. 189-207. Including discussions of paper: Skurnick, D., *PCAS* LXI, 1974, pp. 73-83; and authors' response, *PCAS* LXI, 1974, pp. 84-85.	Fisher and Lange	A1, A2, A4	**W**
Fisher, W.H.; and Lester, E.P., "Loss Reserve Testing in a Changing Environment," *PCAS* LXII, 1975, pp. 154-171.	Fisher and Lester	A2, A3, A4, A5	**W**
Hayne, R.H., "Unearned Premium Reserves—Change is in the Wind," Casualty Actuarial Society *Forum*, Fall 1999, pp. 177-205.	Hayne	A1, A2	**W**
Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapters 4, 6, 7, 11, and Appendix F (Glossary of Accounting Terms).	IASA	B2, B4, C1, C2, C9	**L**
Johnson, W.A., "Determination of Outstanding Liabilities for Unallocated Loss Adjustment Expenses," *PCAS* LXXVI, 1989, pp. 111-125. Corrections to Exhibits 2-5 are included.	Johnson	A1, A2	**W**
Kittel, J., "Unallocated Loss Adjustment Expense Reserves in an Inflationary Economic Environment," *Inflation Implications for Property-Casualty Insurance*, Casualty Actuarial Society *Discussion Paper Program*, 1981, pp. 311-331. Including discussion of paper: Bill, R., pp. 332-343.	Kittel	A1, A2	**W**

Citation	Abbreviation	Learning Objective	Source
Ludwig, S.J., "An Exposure Rating Approach to Pricing Property Excess-of-Loss Reinsurance," *PCAS* LXXVIII, 1991, pp. 110-145. Includes discussion: Feldblum, S., *PCAS* LXXX, 1993, pp. 380-395.	Ludwig	C3, C4	**W**
Mack, T. "Credible Claims Reserve: The Benktander Method," *ASTIN Bulletin*, 2000, pp. 333-337.	Mack	A1	**W** **NEW**
Marshall, D.H.; McManus, W.W.; and Scoles, K.N., Jr., *Accounting and Finance for Insurance Professionals* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 2001, Chapters 5 and 11 (pp. 11.1-11.6, 11.26-11.39, 11.45). Note: Although other portions of the text will not specifically be tested, candidates may find this text to be useful as basic accounting background.	Marshall et al.	B1, B2, B5	**SK**
McKnight, M.B., "Reserving for Financial Guaranty Products," Casualty Actuarial Society *Forum*, Fall 2001, pp. 256-279. (Candidates will not be held responsible for the general background material found on pp. 256-269.)	McKnight	A1, A2	**W**
Ollodart, B.E., "Loss Estimates Using S Curves: Environmental and Mass Tort Liabilities," Casualty Actuarial Society *Forum*, Winter 1997, pp. 111-132.	Ollodart	A6	**W**
Patrik, G.S., "Reinsurance," *Foundations of Casualty Actuarial Science* (Fourth Edition), Casualty Actuarial Society, 2001, Chapter 7, pp. 434-464 (section on Reinsurance Loss Reserving).	Patrik	C6, C7, C8	**W**
Pinto, E.; and Gogol, D.F., "An Analysis of Excess Loss Development," *PCAS* LXXIV, 1987, pp. 227-255. Including discussions of paper: Levine, G.M., *PCAS* LXXIV, 1987, pp. 256-271; and Bear, R.A., *PCAS* LXXIX, 1992, pp. 134-148.	Pinto and Gogol	A1, A2	**W**
Resony, A.V., "Allocated Loss Expense Reserves," *PCAS* LIX, 1972, pp. 141-149. Including discussion of paper: Petz, E.F., *PCAS* LX, 1973, pp. 157-160.	Resony	A1, A2	**W**
Siewert, J.J., "A Model for Reserving Workers Compensation High Deductibles," Casualty Actuarial Society *Forum*, Summer 1996, pp. 217-244.	Siewert	A1, A2	**W**
Stanard, J.N., "A Simulation Test of Prediction Errors of Loss Reserve Estimation Techniques," *PCAS* LXXII, 1985, pp. 124-148. Including discussion of paper: Robertson, J.P., *PCAS* LXXII, 1985, pp. 149-153; Peck, E.F., *PCAS* LXXXII, 1995, pp. 104-120.	Stanard	A2	**W**
Steeneck, L., "Commutation of Claims," CAS Study Note, 1998.	Steeneck	C4	**W**

Citation	Abbreviation	Learning Objective	Source
Teng, M.T.S.; and Perkins, M.E., "Estimating the Premium Asset on Retrospectively Rated Policies," *PCAS* LXXXIII, 1996, pp. 611-647. Including discussion of paper: Feldblum, S., PCAS LXXXV, 1998, pp. 274-315. Candidates will not be held responsible for specific Annual Statement notation but will be responsible for concepts presented.	Teng and Perkins	A1, A2	**W**
Troxel, T.E.; and Bouchie, G.E., *Property-Liability Insurance Accounting and Finance* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1995, Chapters 2 and 3 (pp. 126-131).	Troxel and Bouchie	B2, B5	**SK**
Wiser, R.F.; Cockley, J.E; and Gardner A., "Loss Reserving," *Foundations of Casualty Actuarial Science* (Fourth Edition), Casualty Actuarial Society, 2001, Chapter 5, pp. 197-285.	Wiser et al.	A1, A2, A4	**W**

Source Key

L   May be purchased from the publisher or bookstore or borrowed from the CAS Library.

NEW   Indicates new or updated material or modified citation.

SK   Represents material included in the 2004 CAS Study Kit.

SKU   Represents material included in the 2004 CAS Study Kit and the 2004 Update to the 2003 Study Kit.

W   Represents material that is available at no charge from the "Admissions" section of CAS Web Site (www.casact.org) under Syllabus Web Notes. (For those without access to the Internet, printed copies of the Web Notes are available.)

Publishers and Distributors

Contact information is furnished for those who wish to purchase the text references cited for Exam 6. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

ACTEX Publications, 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; Web site: www.actexmadriver.com; e-mail: retail@actexmadriver.com.

Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.

American Institute for Chartered Property Casualty Underwriters, Order Department, P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Casualty Actuarial Society *Forum*, *Foundations of Casualty Actuarial Science* (Fourth Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Financial Accounting Standards Board, 401 Merret 7, P.O. Box 5116, Norwalk, CT 06856-5116; telephone: (203) 847-0700.

Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.

Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

SlideRule Books, 10 First Avenue East, Mobridge, SD 57601; telephone: (877) 407-5433 or (605) 845-5580; fax: (877) 417-5433 or (605) 845-7627; Web site: www.sliderulebooks.com.

Exam 7-Canada
Nation-Specific Examination: Annual Statement, Taxation, and Regulation

Before commencing study for this four-hour examination, candidates should read the introduction to "Materials for Study" on page 29 of this *Syllabus* for important information about learning objectives, knowledge statements, readings, and the range of weights. Items marked with a bold **SK** or **SKU** constitute the 2004 CAS Exam 7-Canada Study Kit that is available from the CAS Office for a cost of $110. Items marked with a bold **W** are available at no charge under Web Notes in the "Admissions" section of the CAS Web Site (www.casact.org). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2004 CAS Exam 7-Canada Web Notes—from the CAS Office for a cost of $11. The 2004 Update to the 2003 Study Kit is available at a cost of $31 and includes only the items marked with a bold **SKU**. Information about Study Kits and Web Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site for any changes to the *Syllabus*.

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

Section A of this examination includes a comprehensive presentation of Canadian tort law in the perspective of the insurance business in Canada. Section B focuses on insurance regulation and insurance contract law while Section C presents an overview of government and industry insurance programs. Finally, Section D covers financial reporting and solvency issues. It includes insurance accounting and its relevant laws, regulations, and standards of practice. It also deals with solvency monitoring systems such as the Dynamic Capital Adequacy Testing of the Canadian Institute of Actuaries. All sections are complemented, where appropriate, with information from other countries.

A. Background Law and Insurance

Range of weight for Section A: 13-18 percent

The legal foundation of tort law is a subject that is not strictly actuarial in nature, but that affects many areas of an actuary's work. Since no prior legal knowledge is assumed, this first section includes a comprehensive presentation of Canadian tort law including functions of tort law, negligence, strict liability, products liability, government liability, occupiers liability, and damages and remedies. The material in this section should provide background and a basic understanding of how tort law gives rise to the need for insurance.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Identify and describe the key components of tort law. Range of weight: 3-8 percent	a. Functions of tort law b. Negligence theory including standard of care, duty, remoteness of damage and proximate cause, defenses c. Strict liability d. Products liability e. Government liability f. Occupiers' liability
READINGS	
Baer and Rendall Linden	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Identify and describe the underlying principles of insurance law. Range of weight: 0-5 percent	a. Utmost good faith b. Fortuity c. Indemnity d. Consumer protection e. Compensation
READINGS	
Brown	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Discuss major elements of insurance contract law. Range of weight: 0-5 percent	a. Disclosure during negotiation b. Insurable interest c. Policy interpretation d. Relief from forfeiture, waiver, and estoppel e. Dispute resolution f. Liability insurance claims g. Salvage and subrogation
READINGS	
Baer and Rendell Brown	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Distinguish between the different types of damages with respect to remedies in tort. Range of weight: 0-5 percent	a. Nominal damages b. Contemptuous damages c. Real damages d. Punitive or exemplary damages e. Aggravated damages f. Parasitic damages
5. Discuss the measurement of damages and the elements of personal injury damages. Range of weight: 0-5 percent	a. General and special damages b. Restitution in integrum c. Mitigation d. Non-pecuniary loss e. Pecuniary loss f. Structured settlements and judgments g. Survival of actions
READINGS	
Klar et al.	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Discuss options for tort reform. Range of weight: 0-5 percent	a. Options for tort reform
READINGS	
BC Civil Liability CMPA	

B. Regulation of Insurance

Range of weight for Section B: 13-18 percent

Candidates should understand the role of the insurance business as a supplier of an essential service. Because of the essential and highly technical nature of insurance, a system of regulatory controls has been established to require the industry to demonstrate that it is providing fair and reliable services in accordance with the statutes and regulations of the jurisdiction.

The material in this section presents the historical development of insurance regulation in Canada as well as the fundamentals of insurance regulation. This section also includes a comprehensive review of Canadian insurance contract law. Judicial decisions affect insurance regulation to the extent they interpret the law and thereby modify regulatory behavior. Therefore, candidates are presented with a number of Canadian cases that have contributed to the development of legal precedents.

Candidates are also provided with a broad overview of the history, objectives, and current issues surrounding rate regulation in the United States.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the reasons and the objectives of insurance regulation. Range of weight: 3-8 percent	a. Solvency b. Economics c. Contract regulation d. Market conduct e. Rate regulation
READINGS	
Baer and Rendall Ettlinger et al. McDonald	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Describe both the historical development and the current state of insurance regulation, including the division of responsibility between federal and state/provincial regulators. Range of weight: 3-8 percent	a. British North America Act b. Privy Council c. Insurance Companies Act d. Role of CCIR e. Federal and provincial regulation, legislation, and case law f. Federal, foreign, and provincial companies g. U.S. rate regulation
READINGS	
Baer and Rendall Brown Ettlinger et al. McDonald	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Compare and contrast different types of rate filing approaches; discuss state/provincial rate filing guidelines. Range of weight: 0-5 percent	a. Prior approval b. File and use c. Use and file d. Open competition e. State mandated

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Discuss the issues, outcome, rationale and implications of landmark decisions for the insurance industry. Range of weight: 0-5 percent	a. Specific court cases noted in the Complete Text References below.

READINGS
Baer and Rendall
Linden
McDonald
Zurich

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Describe the structure of the insurance industry in Canada. Range of weight: 0-5 percent	a. Types of insurance carriers b. Nature of competition c. Insurance industry organizations d. Types of insurance (social and private, marine and non-marine, indemnity and non-indemnity, group and individual)

READINGS
Baer and Rendall

C. Government and Industry Insurance Programs

Range of weight for Section C: 20-25 percent

Government plans are an intrinsic part of the overall insurance system. The actuary should have a general understanding of Canadian federal and provincial plans. Candidates are expected to be familiar with the basic principles and concepts underlying Canadian Employment Insurance and the Canadian pension programs. Candidates are not expected to have detailed knowledge of the current levels of benefits or the formulae used to calculate such benefits. This section also includes material regarding Canadian earthquake guidelines. Candidates are responsible for a general understanding of Canadian provincial health plans. An understanding of the workers compensation system in Canada is also required. In the statutory automobile insurance area, candidates should understand Canadian automobile insurance programs, including no-fault concepts and residual market requirements. Finally, candidates are introduced to provincial guaranty funds.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the origin and purpose of the following government and industry insurance programs: • Flood insurance • Crop insurance • Unemployment • Medicare/Health Care • Residual markets (e.g., auto, workers compensation, property)	a. Reason for inception b. Major historical developments c. Philosophy of program

• Crime and riot • Workers Compensation • Automobile • Pension Plans • Guaranty Funds Range of weight: 5-10 percent	
2. Describe the operations and risk transfer process for each government/industry program listed in Section C.1, and the interactions of government/industry insurance programs and the voluntary private insurance sector. Range of weight: 5-10 percent	a. Funding mechanisms/sources b. Allocation/assignment of exposures and associated costs c. Eligibility provisions d. Loss payment provisions e. Claim settlement provisions f. Welfare (subsidization) versus insurance principles g. Insurance coverage provisions h. Private response to gap in government program (e.g., Medigap, supplementary health) i. Government response to gap in private program (e.g., FWUA, Canadian Public Auto)
3. Evaluate the effectiveness of a government/industry program (actual, as listed in Section C.1, or hypothetical). Range of weight: 5-10 percent	a. How to measure performance of programs: • Solvency • Efficiencies • Stability • Viability/longer term prospects b. How well program meets its purpose c. Impact of external factors (e.g., economic conditions, weather, regulation, etc.)

READINGS
CIA: Health Care FA FSCO Greenan Greene Groupement des assureurs automobiles (Plan and By-Law 7) Hamilton and Ferguson IBC Alberta Automobile IBC Availability KPMG, et al. 1 and 2 New Brunswick Auto OSFI Earthquake PACICC 1 PACICC 2

D. Financial Reporting and Taxation

Range of weight for Section D: 40-50 percent

This section covers finance and solvency issues. The intent is to address Canadian and global issues. The lack of Canadian literature on certain subjects led to the use of U.S. material. In the long run, the core of the syllabus will be on Canadian matters with an overview of other countries' relevant differences.

Candidates should have detailed familiarity with the contents, purposes, and recent changes in the Annual Return. This includes recent guidelines from the Office of the Superintendent of Financial Institutions and the provincial regulatory bodies. Candidates should be prepared to discuss professional guidelines and standards of practice applicable to financial reporting.

Candidates should understand the details of, and the reasons for the differences between, the Statutory and Generally Accepted Accounting Principles (GAAP) accounting methods.

This section is complemented by readings on solvency monitoring systems such as the Minimum Capital Test and the Dynamic Capital Adequacy Testing of the Canadian Institute of Actuaries.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Evaluate the financial health of an insurance entity. Range of weight: 19-21 percent	a. Annual Statement and Annual Return • Balance sheet • Income statement • Change in surplus • Notes to financial statements • Cash flow exhibit • Actuarial liabilities • Reinsurance accounting b. Risk-Based Capital, Minimum Capital Test c. Dynamic Capital Adequacy Testing d. Rating Agencies e. IRIS Ratios

READINGS
A.M. Best Canada Cantin and Trahan CCIR Instructions CIA CSOP (2500) CIA DCAT CIA Discounting Feldblum Gorvett IASA NAIC Annual Statement OSFI Actuarial Liabilities OSFI MCT OSFI Reinsurance PwC Uniform Annual Return

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Complete specific schedules and exhibits of Annual Statements/Annual Returns: • Balance sheet • Income statement • Schedule P • Insurance Expense Exhibit • Schedule F • Net Claims and Adjustment Expenses Runoff Range of weight: 5-7 percent	a. Valuation of assets and liabilities b. Schedule P c. Calculation of change in surplus d. Calculation of net income e. Calculation of Insurance Expense Exhibit f. Calculation of reinsurance penalties g. Calculation of excess (deficiency) ratio from page 60.40 of the Annual Return

READINGS
CCIR Instructions
CIA Runoff
Feldblum
IASA
NAIC Annual Statement
OSFI Reinsurance
Uniform Annual Return

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Calculate the RBC/MCT and interpret its results. Range of weight: 4-6 percent	a. RBC/MCT Formula b. Definition of components of RBC/MCT

READINGS
OSFI MCT

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Differentiate between different accounting reporting principles (e.g., GAAP, SAP, IAS) Range of weight: 3-5 percent	a. U.S. Statutory Accounting Principles b. Generally Accepted Accounting Principles c. Adjustments to go from SAP to GAAP d. Canadian Statutory Accounting Principles e. Actuarial Liabilities f. Fair value of claims liabilities g. International Accounting Standards h. Direct Expense Report

READINGS
CIA CSOP (2200)
CIA Discounting
CIAA Fair Value
IASA
IBC Expense
OSFI Actuarial Liabilities

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Explain the responsibilities of an actuary as defined by standards of practice, regulators and insurance laws for financial reporting. Range of weight: 9-11 percent	a. Statutory Actuarial Opinion b. Contents of Statutory Report of the Actuary c. Standards of Practice d. Educational Notes e. Insurance Companies Act f. Actuary and auditor relationship

READINGS
CIA AA Standards
CIA CSOP 1630, 2100, 2200, 2400
CIA Discounting
CIA Peer Review
CIA Runoff
ICA
OSFI Memorandum
OSFI Peer Review

Complete Text References for Exam 7-Canada

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
A.M. Best Canada Ltd., *Best's Key Rating & Statistical Guide, Property-Casualty, Canada*, 2002, Parts 1 and 2. Candidates are not expected to memorize the Minimum Asset Test and the details of published insurance statistics.	A.M. Best Canada	D1	**SK**
Baer, M.G.; and Rendall, J.A., *Cases on the Canadian Law of Insurance* (Fifth Edition), Carswell, 1995, pp. 23-28, 33-34, 36-44, 59-88 (excluding tables on pp. 62-67), 90-97, 277-279, 423-426, 507-519, 742-748 and 750-752. Candidates are responsible for the following cases: *R. v. Anderson and Teskey*; *R. v. Parks*; *Gray v. Kerslake*; *Glenn v. Scottish Union and National Insurance Company Ltd.* (Chapter 1); *Regal Films Corporation Ltd. v. Glens Falls Insurance Company* (Chapter 2); *Berkowitz v. MPIC* (Chapter 7); *Fletcher v. MPIC* (Chapter 8); *Broadhurst and Ball v. American Home*; and *Dillon v. Guardian Insurance* (Chapter 11).	Baer and Rendall	A1, A3, B1, B2, B5	**SK**
British Columbia, Ministry of Attorney General, "Civil Liability Review, Consultation Paper," April 2002; and "Civil Liability Review, Summary of Responses," February 2003, Executive Summary only [available at http://www.ag.gov.bc.ca/liability-review/publications/consultation-paper-final.pdf and http://www.ag.gov.bc.ca/liability-review/publications/SummaryResponses.pdf].	BC Civil Liability	A6	**SKU NEW**
Brown, C., *Canadian Insurance Contracts Law in a Nutshell*, Carswell, 1995 Edition, Chapters 1-3, 5, 6, 9, 11, 12 (Sections 5 and 6 only) and 13.	Brown	A2, A3, B2, B4	**L**
Canadian Council of Insurance Regulators, *Annual Statement Instructions P&C-1*, Sections I, III, IV, V and VI, excluding instructions for Annual Return pp. 30.40, 30.70, and 30.71. [Note: Page numbers refer to the 2002 statement. The Web version of the *Syllabus* and the *Notice of Examinations* will contain updated page references.]	CCIR Instructions	D1, D2	**L NEW**
Canadian Institute of Actuaries, Consolidated Standards of Practice, 1630, 2100, 2200, 2400, and 2500.	CIA CSOP	D1, D4, D5	**SKU NEW**
Canadian Institute of Actuaries, "Draft Educational Note: Review of the Work of an Actuary," March 2003.	CIA Peer Review	D5	**SKU NEW**
Canadian Institute of Actuaries, "Educational Note: The Application of the Standards for the Appointed Actuary's Report to Property and Casualty Insurance Companies," 1997.	CIA AA Standards	D5	**SK**
Canadian Institute of Actuaries, "Educational Note: Discounting," April 1999.	CIA Discounting	D1, D4, D5	**SK**

Citation	Abbreviation	Learning Objective	Source
Canadian Institute of Actuaries, "Educational Note: Dynamic Capital Adequacy Testing—Life, Property and Casualty," June 1999. Candidates are not responsible for details related to life insurance companies.	CIA DCAT	D1	**SK**
Canadian Institute of Actuaries, "Educational Note: Evaluation of the Runoff of Claims Liabilities when the Liabilities are Discounted in Accordance with Accepted Actuarial Practice," March 2003.	CIA Runoff	D2, D5	**SKU NEW**
Canadian Institute of Actuaries, "Submission to the Commission on the Future of Health Care in Canada," January 2002.	CIA Health Care	C1, C2, C3	**SK**
Canadian Insurance Accountants Association, Professional Development Program, The Insurance Accountants' Information Circular MDR-31, *Fair Value of Claims Liabilities,* Joe S. Cheng & Partners Inc.	CIAA Fair Value	D4	**SK**
The Canadian Medical Protective Association, "Proceedings of the Tort Reform Conference," Toronto, Ontario, November 5, 1998, pp. 24-38 and Appendix C.	CMPA	A6	**SKU NEW**
Cantin, C.; and Trahan, P.; "Study Note on the Actuarial Evaluation of Premium Liabilities," CAS Study Note, 1999. Candidates will be responsible for Exhibits but not for Appendices.	Cantin and Trahan	D1	**W**
Ettlinger, K.H.; Hamilton, K.L.; and Krohm, G., *State Insurance Regulation* (First Edition), Insurance Institute of America, 1995, Chapter 4 (including Exhibits 4-1 and 4-3). Candidates will not be tested on material that appears only in the exhibits unless the exhibit is specifically identified in the *Syllabus*.	Ettlinger et al.	B1, B2, B3	**L**
Facility Association, *Plan of Operation*, Consolidated January 2001, pp. 1-9, 25-41.	FA	C1, C2, C3	**SK**
Feldblum, S., "Direct Charges and Credits to Surplus," CAS Study Note, April 1999.	Feldblum	D1, D2	**W**
Financial Services Commission of Ontario, *Section 410 Filing Guidelines–Major for Proposed Revisions to Automobile Insurance Rates and Risk Classification Systems*, February 2001, Part A, Part B, Part C (Sections 3 - 7 and 10), Appendices B1 and B2.	FSCO	B3, C1, C2, C3	**SK**
Gorvett, R.W.; Tedeschi, J.L.; and Ward, K.A., "Special Issues: Data Sources," *Foundations of Casualty Actuarial Science* (Fourth Edition), Casualty Actuarial Society, 2001, Chapter 10, pp. 787-796.	Gorvett	D1	**W**

Citation	Abbreviation	Learning Objective	Source
Greenan, J. (Ed.), *The Handbook of Canadian Pension and Benefit Plans* (Twelfth Edition), 2002, CCH Canadian Limited, Chapters 3, 12, 13-15.	Greenan	C1, C2, C3	**L NEW**
Greene, M., "Government Insurers," *Issues in Insurance* (Fourth Edition), American Institute for Property and Liability Underwriters, 1987, Volume I, Sections I and VI.	Greene	C1, C2, C3	**SK**
Groupement des assureurs automobiles, *Risk Sharing Plan—Procedures Manual; By-Law No.7—Risk Sharing Plan*, 1996, Sections 1.1, 1.11, 2.1 to 2.4, 2.7 to 2.9, 3.1 to 3.3, 3.5 to 3.9, 4.1 to 4.3, 4.11 to 4.16, 5.1 to 5.5, 7.1 to 7.6, 8.1 to 8.3, and 9.1 to 9.6.	Groupement des assureurs automobiles: By-Law 7	C1, C2, C3	**SK**
Groupement des assureurs automobiles, *Risk Sharing Plan—Procedures Manual; General Description of the Plan*, 1996, Sections 15A to 15E and 15G.	Groupement des assureurs automobiles: Plan	C1, C2, C3	**SK**
Hamilton, K.L.; and Ferguson, C.L., *Personal Risk Management and Property-Liability Insurance* (First Edition), American Institute for Chartered Property Casualty Underwriters, 2002, pp. 6.20 – 6.34 and 9.36-9.40.	Hamilton and Ferguson	C1, C2, C3	**SKU NEW**
Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapters 2, 5, 9, 10, 13, 17, excluding pp. 17-20, 17-21, and 17-24 to 17-29.	IASA	D1, D2, D4	**L**
Insurance Bureau of Canada, Direct Expense Report, Instructions, Forms and Results, Parts I; and II, Sections A, D, E, and K.	IBC Expense	D4	**L**
Insurance Bureau of Canada, "Insurance Bureau of Canada Submission to Alberta Finance on the Automobile Insurance Consultation Paper," January 24, 2003. [Available at http://demo.flexsite.net/THScripts/THFile.dll?thfile=ZTpcR mxleFNpdGVEYXRhXERvd25sb2FkJnN1Ym1pc3Npb25fY XV0b19jb25zdWx0YXRpb25fcGFwZXJfamFuMjRfMDNf YWxiZXJ0YS5wZGYmYXBwbGljYXRpb24vcGRm.]	IBC Alberta Automobile	C1, C2, C3	**SKU NEW**
Insurance Bureau of Canada, "Residential Insurance Availability," October 2001.	IBC Availability	C1, C2, C3	**SK**
"Insurance Companies Act," *Financial Institutions Act*, Chapter 47, Sections 165(1), 165 (2), 203, 331(1), 331(2), 331(4), 346, 357-370, 464, 465, 476-478, 516(1), 516(4), 517, 581, 626-632, 641, 664, 665, 667(1), 667(2), and 674 (assented to December 13, 1991).	ICA	D5	**SK**

Citation	Abbreviation	Learning Objective	Source
Klar, L.N.; Linden, A.M.; Cherniak, E.A.; and Kryworuk, P.W., *Remedies in Tort*, Carswell, 1997 (Release 6), Volume 4, pp. 27-45 to 27-162.42, excluding pp. 162.2-162.26. Candidates will not be tested on material included in "Additional Authorities" sections. However, candidates might find it helpful to read these sections for further clarification of concepts on which they will be tested. Candidates will not be responsible for text included in references. Candidates will not be responsible for any cases cited in this text.	Klar et al.	A4, A5	**SK**
KPMG, Eckler Partners Ltd. & Exactor Insurance Services, Inc., "Motor Vehicle Insurance in British Columbia—At the Crossroads, Volume I: The Case for Change," Section I, Parts A, B, and C; Section II, Parts A, B, and C. Candidates will not be responsible for information in exhibits.	KPMG et al. 1	C1, C2, C3	**SK NEW**
KPMG, Eckler Partners Ltd. & Exactor Insurance Services, Inc., "Motor Vehicle Insurance in British Columbia—At the Crossroads, Volume II: Options and Choices," Section II. Candidates will not be responsible for information in exhibits.	KPMG et al. 2	C1, C2, C3	**SK**
Linden, A.M., *Canadian Tort Law* (Seventh Edition) (paperback), Butterworths, 2001, pp. 1-32, 101-116, 119-127, 129-151, 160-164, 233-243, 267-276, 280-282, 296-298, 323-328, 344-346, 370-372, 445-447, 451-460, 469-474, 478-481, 486-489, 491-495, 503-514, 553-563, 567-581, 585-599, 607-609, 611-621, 629-635, 637-643, and 650. Candidates are responsible for the following cases: *Rylands v. Fletcher* (Chapter 14); *Donaghue v. Stevenson* (Chapter 16); and *Just v. British Columbia* (Chapter 17).	Linden	A1, B4	**L**
McDonald, B.R., *Life Insurance Laws of Canada (Common Law Provinces)*, Life Underwriters Association of Canada, 1995, pp. A1-1, A2-1 to A2-9, B1-1 to B1-2, B2-1 to B2-3, and B4-1 to B4-3. Candidates are responsible for all cases cited in this text.	McDonald	B1, B2, B4	**SK**
National Association of Insurance Commissioners, *Official NAIC Annual Statement Blanks, Property and Casualty*, 2003 (both individual and consolidated basis), pp. 2-4, Schedule P. Candidates will be expected to have knowledge of other sections of the annual statement that are discussed in other *Syllabus* readings. [Note: Page numbers refer to the 2002 statement. The Web version of the *Syllabus* and the *Notice of Examinations* will contain updated page references.]	NAIC Annual Statement	D1, D2	**L NEW**

Citation	Abbreviation	Learning Objective	Source
New Brunswick, "Auto Insurance for New Brunswick–Final Report of the Select Committee on Private Passenger Automobile Insurance," November 2002, pp. 7-21; and "New Brunswick Canada–Government Response to the Report of the Select Committee on Private Passenger Automobile Insurance," March 28, 2003. [See http://www.gnb.ca/legis/business/committees/pdf/insurance-e.pdf and http://www.gnb.ca/0062/insurance/Insurance Select Com-Final-e.pdf.]	New Brunswick Auto	C1, C2, C3	**SKU NEW**
Office of the Superintendent of Financial Institutions Canada, "2002 Memorandum for Actuarial Reports on Property and Casualty Business," November 2002.	OSFI Memorandum	D5	**SKU NEW**
Office of the Superintendent of Financial Institutions Canada, "Accounting for Property Casualty Actuarial Liabilities," September 4, 1997.	OSFI Actuarial Liabilities	D1, D4	**SK**
Office of the Superintendent of Financial Institutions Canada, Draft Guideline E-15 "Appointed Actuary: Legal Requirements, Qualifications and Peer Review," Section 3 (Peer Review), November 2002.	OSFI Peer Review	D5	**SKU NEW**
Office of the Superintendent of Financial Institutions Canada, "Earthquake Exposure Sound Practices Guideline," 1997, including Appendices 1 and 2. Candidates are not responsible for the tables in Appendix 2.	OSFI Earthquake	C1, C2, C3	**SK**
Office of the Superintendent of Financial Institutions Canada, "Guideline on Accounting for Reinsurance of Short-Term Insurance Contracts by Property and Casualty Insurance Enterprises," February 7, 1998.	OSFI Reinsurance	D1, D2	**SK**
Office of the Superintendent of Financial Institutions Canada, "Guideline—Minimum Capital Test (MCT) for Property and Casualty Insurance Companies," pp. 1-9, 17-22, July 2003; and "Notes on the Development of the Minimum Capital Test (MCT)," pp. 1-7, July 2003.	OSFI MCT	D1, D3	**SKU NEW**
PricewaterhouseCoopers, "Financial Reporting for the Property & Casualty Insurance Industry," 1999.	PwC	D1	**SK**
Property and Casualty Insurance Compensation Corporation, "Options to ensure another fifteen successful years of service," March 4, 2003 (excluding Annex D, PACICC member questionnaire).	PACICC 1	C1, C2, C3	**SKU NEW**
Property and Casualty Insurance Compensation Corporation, "A Proactive vision for PACICC in a challenging business environment," April 29, 2003 (excluding Annex A and Annex B).	PACICC 2	C1, C2, C3	**SKU NEW**

Citation	Abbreviation	Learning Objective	Source
Uniform Annual Return (2003) approved by the Canadian Council of Insurance Regulators—P&C-1, pp. 10.40-10.42, 10.60, 20.10-20.52, 30.15 (Reserves Required), 30.20, 40.10, 40.90, 60.xx, 67.xx, 70.10-70.35, 80.xx, and 99.10. [Note: Page numbers refer to the 2002 statement. The Web version of the *Syllabus* and the *Notice of Examinations* will contain updated page references.]	Uniform Annual Return	D1, D2	**L** **NEW**
Zurich Insurance Company vs. Ontario Human Rights Code (C.D.P.), [1992] 2 R.C.S., pp. 321-328.	Zurich	B4	**SK**

Source Key

L   May be borrowed from the CAS Library.

NEW   Indicates new or updated material or modified citation.

SK   Represents material included in the 2004 CAS Study Kit.

SKU   Represents material included in the 2004 CAS Study Kit and the 2004 Update to the 2003 Study Kit.

W   Represents material that is available at no charge from the "Admissions" section of CAS Web Site (www.casact.org) under Syllabus Web Notes. (For those without access to the Internet, printed copies of the Web Notes are available for a fee.)

Publishers and Distributors

Contact information is furnished for those who wish to purchase the texts cited for Exam 7-Canada. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

ACTEX Publications, 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; Web site: www.actexmadriver.com; e-mail: retail@actexmadriver.com.

A.M. Best Canada Ltd., Suite 600, 133 Richmond Street West, Toronto, Ontario M5H 2I3, Canada; telephone: (416) 363-8266; Web site: www.ambest.ca.

Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

American Institute for Chartered Property Casualty Underwriters, Order Department, P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Baer, M.G.; and Rendall, J.A., *Cases on the Canadian Law of Insurance* (Fifth Edition), 1995, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800 or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.

Brown, C.; *Canadian Insurance Contracts Law in a Nutshell*, 1995, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800 or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.

Canadian Institute of Actuaries, Secretariat, Suite 820, 360 Albert Street, Ottawa, Ontario K1R 7X7, Canada; telephone: (613) 236-8196; fax: (613) 233-4552; Web site: www.actuaries.ca.

Casualty Actuarial Society *Forum*, *Foundations of Casualty Actuarial Science* (Third Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Ettlinger, K.H.; Hamilton, K.L.; and Krohm, G., *State Insurance Regulation* (First Edition), 1995, Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0770; telephone: (610) 644-2100.

Facility Association, 20 Richmond Street East, Suite 200, Toronto, Ontario M5C 2R9, Canada; telephone: (416) 863-1750 or (800) 268-9572; fax: (416) 868-0894.

Financial Institutions Act, "Insurance Companies Act," Chapter 47, The Federal Publication, 388 King Street West, Toronto, Ontario M5V 1K2, Canada; telephone: (416) 860-1611.

Financial Services Commission of Ontario, 5160 Yonge Street, P.O. Box 85, North York, Ontario M2N 6L9, Canada; telephone: (416) 250-7250; fax: (416) 590-7070; Web site: www.ontarioinsurance.com.

Greenan, J. (Ed.), *The Handbook of Canadian Pension and Benefit Plans* (Twelfth Edition), 2002, CCH Canadian Limited, 90 Shepherd East, Suite 300, North York, Ontario M2N 6X1, Canada; telephone: (416) 224-2248; fax: (800) 461-4131; Web site: www.ca.cch.com.

Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.

Insurance Bureau of Canada, 240 Duncan Mill Road, Suite 700, Toronto, Ontario M3B 1Z4, Canada; telephone: (416) 445-5912; fax: (416) 445-2183.

Klar, L.N.; Linden, A.M.; Cherniak, E.A.; and Kryworuk, P.W., *Remedies in Tort*, 1997 (Release 6), Volume 4, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800 or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.

Linden, A.M., *Canadian Tort Law* (Seventh Edition), 2001, Butterworths, The Butterworths Group of Companies, 75 Clegg Road, Markham, Ontario L6G 1A1, Canada; telephone: (905) 479-2665; fax: (905) 479-2826; Web site: www.butterworths.ca.

National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

Office of the Superintendent of Financial Institutions Canada, 255 Albert Street, Ottawa, Ontario K1A 0H2 Canada; telephone: (613) 990-7788; fax: (613) 952-8219; Web site: www.osfi-bsif.gc.ca.

Exam 7-United States
Nation-Specific Examination: Annual Statement, Taxation, and Regulation

Before commencing study for this four-hour examination, candidates should read the introduction and key to "Materials for Study" on page 29 of this *Syllabus* for important information about learning objectives, knowledge statements, readings, and the range of weights. Items marked with a bold **SK** or **SKU** constitute the 2004 CAS Exam 7-U.S. Study Kit that is available from the CAS Office for a cost of $48. Items marked with a bold **W** are available at no charge under Web Notes in the "Admissions" section of the CAS Web Site (www.casact.org). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2004 CAS Exam 7-U.S. Web Notes—from the CAS Office for a cost of $34. The 2004 Update to the 2003 Study Kit is available at a cost of $14 and includes only the items marked with a bold **SKU**. Information about Study Kits and Web Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site for any changes to the *Syllabus*.

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

Section A of this examination covers U.S. tort law as it affects the property-casualty business. Section B covers insurance regulation with regards to property-casualty coverages, ratemaking, and pricing. Section C covers markets, coverages, and private and governmental programs for the property-casualty business in the United States. Section D covers the aspects of statutory and GAAP insurance accounting and taxation as these affect reserving and statutory reporting in the United States.

A. Background Law

Range of weight for Section A: 5-10 percent

U.S. tort law, while not a strictly actuarial subject, affects many areas of an actuary's work. No prior knowledge is assumed in this area and the readings should provide background and a basic understanding of how tort law gives rise to the need for insurance. The judicial role in the development of tort law is also covered.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the different theories of tort law as applied to insurance. Range of weight: 3-7 percent	a. Types of negligence b. Causation c. Immunities d. Common law principles (e.g., assumption of risk) e. Theories of liability f. Criteria for torts
READINGS	
Lorimer et al. Keeton Hensler et al.	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Describe the difference between tort systems and no-fault systems. Range of weight: 0-5 percent	a. Tort b. No fault (workers compensation, auto) c. History of no fault d. Type of threshold e. Advantages and disadvantages of each f. Experience of individual systems
READINGS	
Hensler et al. Keeton	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Discuss the trends in tort litigation. Range of weight: 0-5 percent	a. Trends in litigation b. Jury awards c. Litigation costs
READINGS	
Hensler et al. Keeton	

B. Regulation of Insurance

Range of weight for Section B: 25-30 percent

Candidates should understand that insurers are regulated by various governmental agencies because insurance is a valuable public service. An understanding of the dual U.S. state and federal regulatory system is required, along with the various state systems of regulation. The major areas of regulation for rate, contract terms, and solvency should be understood, as should the role of antitrust law as it pertains to insurance regulation.

Regulation as it affects insurance ratemaking in the U.S. is covered. The regulator's view of insurer profitability and the concept of excess profit regulation are covered. Regulatory and political aspects of risk classification are also covered. Some learning objectives extend the topic to the regulation and governmental actions to enhance the availability of insurance.

This section also covers the regulation for solvency in the U.S., including financial ratios tested by the National Association of Insurance Commissioners (IRIS tests) and guaranty fund mechanisms set up by the various states. Also covered are risk-based capital calculations from the statutory blank and how they are used to monitor solvency.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the reasons and the objectives of insurance regulation. Range of weight: 8 percent to 12 percent	a. Solvency b. Market conduct c. Rate regulation

READINGS
Bartlett et al.
Brady et al.
Harrington
NAIC Rating
Feldblum (NY Law)
NY Law 23
Ghezzi
Ettlinger et al.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Describe both the historical development and the current state of insurance regulation including the division of responsibility between federal and state/provincial regulators. Range of weight: 3-7 percent	U.S. only: a. SEC reporting and regulation b. McCarran-Ferguson c. Basis of insurance regulation d. Solvency, including RBC, insurance department examination, NAIC regulatory tests e. Functions of NAIC f. Antitrust provisions g. Landmark cases

READINGS
Brady et al.
Wagner
Harrington
Ettlinger et al.
Troxel and Bouchie
Feldblum (RBC)

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Compare and contrast different types of rate filing approaches; discuss state rate filing guidelines. Range of weight: 5-10 percent	a. Prior approval b. File and use c. Use and file d. Open competition e. State mandated

READINGS
Wagner
Harrington
Harrington and Doerpinghaus
Brady et al.
Joskow
Krohm
A.M. Best
Ettlinger et al.
Williams

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Discuss the issues, outcome, rationale and implications of landmark decisions for the insurance industry. Range of weight: 0-5 percent	a. Sherman Antitrust b. McCarran-Ferguson c. Southern Underwriters d. Montrose Claims

READINGS
Lorimer et al. Wagner Harrington

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Describe the different treatment and rationale of that treatment of domestic, foreign, and alien insurers. Range of weight: 0-5 percent	a. Licensing b. Capital Requirements c. Branch versus domestic
READINGS	
Brady et al. Wagner A.M. Best	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Describe the regulatory issues related to catastrophe and other modeling. Range of weight: 0-5 percent	a. Acceptance of models by regulators b. Proprietary issues
READINGS	
Musulin	

C. Government and Industry Insurance Programs

Range of weight for Section C: 10-15 percent

From this section, candidates should gain a detailed knowledge of the U.S. Social Security and Medicare systems. Candidates also should gain a working knowledge of the regulations concerning insurance for catastrophic events. An understanding of the regulatory environment surrounding the U.S. workers compensation system is required. Other federal, state, and industry programs are also covered.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the origin and purpose of the following government and industry insurance programs: • Social Security • Flood insurance • Crop insurance • Unemployment • Medicare/Health Care • Residual markets (e.g., auto, workers compensation, property) • Crime and riot • Nuclear • Workers compensation • Automobile • Pension plans • Guaranty funds Range of weight: 3-7 percent	a. Reason for inception b. Major historical developments c. Philosophy of program

READINGS
Wiening et al.
Rejda
Greene
Hamilton and Ferguson
Ettlinger et al.
Wilcox

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Describe the operations and risk transfer process for each government/industry program, and the interactions of government/industry insurance programs and the voluntary private insurance sector. Range of weight: 5-10 percent	a. Funding mechanisms/sources b. Allocation/assignment of exposures and associated costs c. Eligibility provisions d. Loss payment provisions e. Claim settlement provisions f. Welfare (subsidization) versus insurance principles g. Insurance coverage provisions h. Private response to gap in government program (e.g., Medigap, supplementary health)

READINGS
Weining et al.
Rejda
Greene
Bartlett et al.
Hamilton and Ferguson
Ettlinger et al.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Evaluate the effectiveness of a government/industry program (actual or hypothetical) Range of weight: 0-5 percent	a. How to measure performance of programs b. Solvency c. Efficiencies d. Stability e. Viability/longer term prospects f. How well program meets its purpose g. Impact of external factors (e.g., economic conditions, weather, regulation, etc.)

READINGS
Weining et al.
Rejda
Geene
Bartlett et al.
Hamilton and Ferguson
Ettlinger et al.

D. Financial Reporting and Taxation

Range of weight for Section D: 50-55 percent

This section covers the aspects of statutory and GAAP insurance accounting and taxation as they affect reserving and statutory reporting in the U.S. Candidates should gain a thorough knowledge of U.S. statutory accounting forms presented in the NAIC blanks and the Insurance Expense Exhibits. A detailed knowledge of reserves and values required in the blank is needed. Knowledge of federal income tax treatment, including reserve discounting, should also be mastered.

Related to these areas, this section covers the codification of statutory accounting, differences in the accounting treatment for GAAP, tax, and statutory uses, audits of insurance companies, and some aspects of Canadian accounting for insurance companies.

The material in this examination assumes a working knowledge of general accounting such as that which would be gained from Exam 6. If needed, a review of sections of the IASA text, the old CPCU 8 text on accounting (Chapters 2 -11), the new CPCU 540 text (Part I and II), or other general accounting material may enhance the understanding of the U.S.-specific material presented on this examination.

As background reading for the responsibilities of actuaries, it is highly recommended that the candidate study ASOP 36. The candidate will only be tested on those portions of the ASOP as mentioned in the COPLFR Practice Note.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Evaluate the financial health of an insurance entity. Range of weight: 20-25 percent	a. Annual Statement b. Balance sheet c. Income statement d. Change in surplus e. Notes to financial statements f. Cash flow exhibit g. Reinsurance accounting h. Risk-Based Capital (RBC) i. Rating Agencies j. IRIS ratios
READINGS	
IASA 1 NAIC Annual Statement Feldblum (Selected Notes) 2003 IEE Feldblum (IEE) Kurz NAIC SSAP 62 NAIC SSAP 65 NAIC SSAP 68 Feldblum (RBC) Feldblum (Surplus) Gorvett OSFI MCT Troxel and Bouchie	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Complete specific schedules and exhibits of: • Annual Statements/Annual Returns • Balance sheet • Income statement • Schedule P • IEE • Schedule F Range of weight: 8-12 percent	a. Valuation of assets and liabilities b. Schedule P c. Calculation of change in surplus d. Calculation of net income e. Calculation of Insurance Expense Exhibit f. Calculation of reinsurance penalties
READINGS	
NAIC Annual Statement IASA 1 IASA 2 Feldblum (Selected Notes, Surplus, Schedule F, Schedule P, and IEE) 2003 IEE OSFI MCT NAIC SSAP 46, 53, 62, 65, and 68	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Calculate the RBC and interpret its results. Range of weight: 5-10 percent	a. RBC formula b. Definition of components of RBC
READINGS	
Feldblum (RBC)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Differentiate between different accounting reporting principles, e.g., GAAP, SAP, IAS. Range of weight: 3-7 percent	a. U.S. Statutory Accounting Principles b. Generally Accepted Accounting Principles c. Adjustments to go from SAP to GAAP d. Canadian Statutory Accounting Principles e. Fair value of claims liabilities f. International Accounting Standards
READINGS	
IASA 1 NAIC APPM Preamble OSFI MCT	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Explain the responsibilities of an actuary as defined by standards of practice, regulators and insurance laws for financial reporting. Range of weight: 3-7 percent	a. Statutory Actuarial Opinion b. Standards of Practice c. Actuary and auditor relationship
READINGS	
COPLFR P&C Practice Note	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Calculate specific elements of income tax and evaluate their implications for a property/casualty insurer. Range of weight: 3-7 percent	a. Discounting b. Elements of income tax calculation c. Book income versus taxable income d. Alternative minimum tax
READINGS	
IASA 1 Almagro and Ghezzi NAIC SSAP 65	

Complete Text References for Exam 7-United States

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
2003 Insurance Expense Exhibit.	2003 IEE	D1, D2	**L, NEW**
A.M. Best, *Annual Review of the Excess and Surplus Lines Industry*, September 2001, sections IV and V, pp. 21-32.	A.M. Best	B3, B5	**SK**
Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice, No. 36, Statements of Actuarial Opinion Regarding Property/Casualty Loss and Loss Adjustment Expense Reserves."	ASOP 36	D5	**W NEW**
Almagro, M.; and Ghezzi, T.L., "Federal Income Taxes—Provisions Affecting Property/Casualty Insurers," *PCAS* LXXV, 1988, pp. 95-161. Exclude "Transition Provisions of the Tax Reform Act of 1986" in Appendix A, pp. 138-143.	Almagro and Ghezzi	D6	**W**
Bartlett, D.K.; Klein, R.W.; and Russell, D.T., "Attempts to Socialize Insurance Costs in Voluntary Insurance Markets: The Historical Record," *Journal of Insurance Regulation*, Summer 1999, pp. 478-511.	Bartlett et al.	B1, C2, C3	**SK**
Brady, J.L.; Mellinger, J.H.; and Scoles, K.N., *The Regulation of Insurance* (First Edition), Insurance Institute of America, 1995, Chapters 2 (pp. 43-49), 3, 4, 5 (excluding "Other Federal Regulation Affecting the Insurance Industry," pp 148-154 but including Exhibit 5-1), and 6 (excluding "Other Interest Groups," pp. 172-177 but including Exhibit 6-5). Candidates will not be tested on material that appears only in exhibits unless the exhibit is specifically identified in the *Syllabus*.	Brady et al	B1, B2, B3, B5	**L**
Committee on Property and Liability Financial Reporting, American Academy of Actuaries, "Property and Casualty Practice Note, Statements of Actuarial Opinion on P&C Loss Reserves as of December 31, 2002."	COPLFR P&C Practice Note	D5	**W NEW**

Citation	Abbreviation	Learning Objective	Source
Ettlinger, K.H.; Hamilton, K.L.; and Krohm, G., *State Insurance Regulation* (First Edition), Insurance Institute of America, 1995, Chapter 6 (excluding "Monitoring Capital Adequacy Through Risk-Based Capital," pp. 156-161 but including Exhibits 6-1 and 6-3) and Chapter 8. Candidates will not be tested on material that appears only in exhibits unless the exhibit is specifically identified in the *Syllabus*.	Ettlinger et al.	B1, B2, B3, C1, C2, C3	**L**
Feldblum, S., "Completing and Using Schedule P" (Eighth Edition), CAS Study Note, June 2003. Candidates are not responsible for the end notes.	Feldblum (Schedule P)	D2	**W NEW**
Feldblum, S., "Direct Charges and Credits to Surplus," CAS Study Note, April 1999.	Feldblum (Surplus)	D1, D2	**W**
Feldblum, S., "The Insurance Expense Exhibit and the Allocation of Investment Income" (Fifth Edition), CAS Study Note, May 1997.	Feldblum (IEE)	D1, D2	**W**
Feldblum, S., "NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements," *PCAS* LXXXIII, 1996, pp. 297-389 (excluding Section 11 and related exhibits).	Feldblum (RBC)	B2, D1, D3	**W**
Feldblum, S., "Reinsurance Accounting: Schedule F" (Eighth Edition), CAS Study Note, April 2003.	Feldblum (Schedule F)	D2	**W NEW**
Feldblum, S., "Selected Notes to the Fire and Casualty Annual Statement" (Fourth Edition), CAS Study Note, April 1999. NEW: See "Notes Correlation" that maps the note numbers used in the study note to those used in the 2003 Annual Statement. It will be posted with the study note.	Feldblum (Selected Notes)	D1, D2	**W NEW**
Feldblum, S., "A Student's Guide to the New York Insurance Law; Article 23: Property/Casualty Insurance Rates," CAS Study Note, 1995.	Feldblum (NY Law)	B1	**W**
Ghezzi, T.L., "Actuarial Perspective on Property/Casualty Redlining Issues," *Actuarial Digest*, Volume 15, No. 1, February/March 1996.	Ghezzi	B1	**SK**
Gorvett, R.W.; Tedeschi, J.L.; and Ward, K.A., "Special Issues—Data Sources," *Foundations of Casualty Actuarial Science* (Fourth Edition), Casualty Actuarial Society, 2001, Chapter 10, pp. 787-796.	Gorvett et al.	D1	**W**
Greene, M. "Government Insurers," *Issues in Insurance* (Fourth Edition), American Institute for Property and Liability Underwriters, 1987, Volume I (excluding Chapters IX and X).	Greene	C1, C2, C3	**SK**
Hamilton, K.L.; and Ferguson, C.L., *Personal Risk Management and Property-Liability Insurance* (First Edition), American Institute for Chartered Property Casualty Underwriters, 2002, pp. 6.20 – 6.34 and 9.36-9.40.	Hamilton and Ferguson	C1, C2, C3	**SKU NEW**

Citation	Abbreviation	Learning Objective	Source
Harrington, S.E., "Insurance Rate Regulation in the 20th Century," *Journal of Insurance Regulation*, Winter 2000, pp. 204-217.	Harrington	B1, B2, B3, B4	**SK**
Harrington, S.E.; and Doerpinghaus, H.I., "The Economics and Politics of Automobile Insurance Rate Classification," *Journal of Risk and Insurance*, 1993, pp. 59-84.	Harrington and Doerpinghaus	B3	**SK**
Hensler, D.R.; Vaiana, M.E.; Kakalik, J.S.; and Peterson, M.A., *Trends in Tort Litigation, The Story Behind the Statistics*, Rand Institiute for Civil Justice, 1987.	Hensler et al.	A1, A2, A3	**SK**
Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapters 2, 5, 8, 9, 10, 12-14, and 17. (For Chapter 12, only pp. 1-36 and 62-72.)	IASA 1	D1, D2, D4, D5, D6	**L**
Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Appendix D, pp. D12, D13, D20, D21, D22, and D23 (Canadian Annual Statement Exhibits).	IASA 2	D2, D4	**L**
Joskow, P.L., "Cartels, Competition, and Regulation in the Property-Liability Insurance Industry," *RAND Journal of Economics*, Autumn 1973, pages 375-427.	Joskow	B3	**SK**
Keeton, R. "The Impact on Insurance of Trends in Tort Law," *Issues in Insurance* (Third Edition), American Institute for Property and Liability Underwriters, 1984, Volume I.	Keeton	A1, A2, A3	**SK**
Krohm, G., "Implications of ISO's Change to Loss Cost Filing for Rate Regulation," *Journal of Insurance Regulation*, March 1990, pp. 316-329.	Krohm	B3	**SK**
Kurz, R.M., "Uniform Classification of Expenses for Property and Liability Insurance Companies," Insurance Accounting and Systems Association *Proceedings* 1979, pp. 290-292.	Kurz	D1	**SK**
Lorimer, J.J.; Perlet, H.F.; Kempin, F.G.; and Hodosh, F.R., *The Legal Environment of Insurance* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1993, Volume II, pp. 1-28, and 71-104. Note: Candidates must use the fourth edition.	Lorimer et al.	A1, B4	**SK**
Musulin, R.T., "Issues in the Regulatory Acceptance of Computer Modeling for Property Insurance Ratemaking," *Journal of Insurance Regulation*, Spring 1997, pp. 342-359.	Musulin	B6	**SK**
National Association of Insurance Commissioners, *Accounting Practices and Procedures Manual*, 2003, Preamble.	NAIC APPM Preamble	D4	**SKU NEW**
National Association of Insurance Commissioners, *Accounting Practices and Procedures Manual*, 2003, Statement of Statutory Accounting Principles 46, "Investments in Subsidiary, Controlled, and Affiliated Entities," paragraphs 1-22.	NAIC SSAP 46	D2	**SKU NEW**

Citation	Abbreviation	Learning Objective	Source
National Association of Insurance Commissioners, *Accounting Practices and Procedures Manual*, 2003, Statement of Statutory Accounting Principles 53, "Property Casualty Contracts—Premiums," paragraphs 1-17.	NAIC SSAP 53	D2	**SKU NEW**
National Association of Insurance Commissioners, *Accounting Practices and Procedures Manual*, 2003, Statement of Statutory Accounting Principles 62, "Property and Casualty Reinsurance," paragraphs 1-71.	NAIC SSAP 62	D1, D2	**SKU NEW**
National Association of Insurance Commissioners, *Accounting Practices and Procedures Manual*, 2003, Statement of Statutory Accounting Principles 65, "Property and Casualty Contracts," paragraphs 1-45.	NAIC SSAP 65	D1, D2, D6	**SKU NEW**
National Association of Insurance Commissioners, *Accounting Practices and Procedures Manual*, 2003, Statement of Statutory Accounting Principles 68, "Business Combinations and Goodwill," paragraphs 1-13.	NAIC SSAP 68	D1, D2	**SKU NEW**
National Association of Insurance Commissioners, *Official 2003 NAIC Annual Statement Blanks, Property and Casualty*, (both individual and consolidated basis), pp. 2-13, Notes to the Financial Statement pp. 14, 22-26, 31, and 32; Schedules D (pp. 28-34 and E-08 through E-14), DM (p. E-23), F (pp. 40-47), H (pp. 48-50), P (pp. 51-109). Candidates will be expected to have knowledge of other sections of the annual statement that are discussed in other *Syllabus* readings.	NAIC Annual Statement	D1, D2	**L NEW**
National Association of Insurance Commissioners, "Report of the Advisory Committee on Competitive Rating to the National Association of Insurance Commissioners," *Proceedings*, 1980, Volume II, Chapter III. Candidates will not be responsible for the language of the model rating law itself nor the alternative model laws submitted in the report.	NAIC Rating	B1	**SK**
New York (State) Laws, Statutes, etc., *New York Insurance Law*, Article 23 (all sections). Candidates are responsible only for the sections of the law as stated. If studying from publications such as the Consolidated Laws Service, which cite case histories as well as the law itself, candidates are not responsible for the case histories although they may be helpful in gaining an understanding of the law. Candidates will not be tested on those sections of the New York laws dealing exclusively with life insurance and/or annuities.	New York Law 23	B1	**SK**
Office of the Superintendent of Financial Institutions Canada, "Guideline—Minimum Capital Test (MCT) for Property and Casualty Insurance Companies," pp. 1-9, 17-22, July 2003.	OSFI MCT	D1, D2, D4	**SKU NEW**
Rejda, G.E., "Financing the Social Security Program," *Social Insurance & Economic Security* (Sixth Edition), Prentice Hall, 1999, Chapter 7 (pp. 148-166).	Rejda	C1, C2, C3	**SK**

Citation	Abbreviation	Learning Objective	Source
Troxel, T.; and Bouchie, G.E., *Property-Liability Insurance Accounting and Finance* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1995, pp. 216-236.	Troxel and Bouchie	B2	**SK**
Wagner, T., "Insurance Rating Bureaus," *Journal of Insurance Regulation*, Winter 2000, pp. 189-202.	Wagner	B2, B3, B4, B5	**SK**
Wilcox, C.J., "The US Guaranty Association Concept at 25," *Journal of Insurance Regulation*, Spring 1996, pp. 369-371 (up to The Life and Health Scorecard) and pp. 385-403 (starting with The Property and Casualty Scorecard).	Wilcox	C1	**SK**
Williams, C.A., "Regulating Property and Liability Insurance Rates Through Excess Profits Statutes," *Journal of Risk and Insurance*, September 1983, pp. 445-472.	Williams	B3	**SK**
Weining, E.A.; Rejda, G. E.; Luthardt, C.M.; and Ferguson, C.L.; *Personal Insurance* (First Edition), American Institute for Chartered Property Casualty Underwriters, 2002, pp. 10.25-10.32 and 12.26-12.33.	Weining et al.	C1, C2, C3	**SKU NEW**

Source Key

L   May be purchased from the publisher or bookstore or borrowed from the CAS Library.

NEW   Indicates new or updated material or modified citation.

SK   Represents material included in the 2004 CAS Study Kit.

SKU   Represents material included in the 2004 CAS Study Kit and the 2004 Update to the 2003 Study Kit.

W   Represents material that is available at no charge from the "Admissions" section of CAS Web Site (www.casact.org) under Syllabus Web Notes. (For those without access to the Internet, printed copies of the Web Notes are available for a fee.)

Publishers and Distributors

Contact information is furnished for those who wish to purchase the text references cited for Exam 7-United States. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

ACTEX Publications (Mad River Books), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com.

Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

Actuarial Digest, P.O. Box 1127, Ponte Vedra, FL 32004.

American Institute for Chartered Property Casualty Underwriters, Order Department, P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Association Form of the Annual Statement Blanks, Bowne Insurance Division, 800 Central Boulevard, Carlstadt, NJ 07072; telephone: (800) 223-3103.

Casualty Actuarial Society *Forum*, *Foundations of Casualty Actuarial Science* (Fourth Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.

Insurance Expense Exhibit, Bowne Insurance Division, 800 Central Boulevard, Carlstadt, NJ 07072; telephone: (800) 223-3103.

Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0770; telephone: (610) 644-2100.

Journal of Insurance Regulation, National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

Journal of Risk and Insurance, The, American Risk and Insurance Association, 716 Providence Road, P.O. Box 3028, Malvern, PA 19355; telephone: (610) 640-1997; fax: (610) 725-1007; Web site: www.aria@cpcuiia.org.

NAIC Annual Statement Blanks, Property and Casualty may be obtained from Bowne Insurance Division, 800 Central Boulevard, Carlstadt, NJ 07072; telephone: (800) 223-3103.

National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

New York (State) Insurance Department, Publications Unit, Agency Building 1, Empire State Plaza, Albany, NY 12257; telephone: (518) 474-1203.

New York (State) Laws, Statutes, etc., from New York Insurance Law may be obtained from the West Publishing Company, a division of International Thompson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.

Rejda, G.E., *Social Insurance and Economic Security* (Sixth Edition), 1999, Prentice-Hall, Inc.; telephone: (800) 374-1200.

Fellowship Exams

Exam 8
Investments and Financial Analysis

Before commencing study for this four-hour examination, candidates should read the introduction to "Materials for Study" on page 29 of this *Syllabus* for important information about learning objectives, knowledge statements, readings, and the range of weights. Items marked with a bold **SK** or **SKU** constitute the 2004 CAS Exam 8 Study Kit that is available from the CAS Office for a cost of $25. Items marked with a bold **W** are available at no charge under Web Notes in the "Admissions" section of the CAS Web Site (www.casact.org). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2004 CAS Exam 8 Web Notes—from the CAS Office for a cost of $24. The 2004 Update to the 2003 Study Kit is available at a cost of $5 and includes only the items marked with a bold **SKU**. Information about Study Kits and Web Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site for any changes to the *Syllabus*.

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

Exam 8 focuses on a broad array of finance, investment, and financial risk management topics. The exam can be viewed as having two parts, with Sections A-G covering mostly financial theory and tools and Sections H-J covering various financial applications. The material in Exam 8 builds most particularly on the finance material in Exam 2. It also presupposes knowledge about liability and reserve risk from Exam 6, underwriting exposure from Exam 5, and knowledge of models and modeling from Exams 3 and 4.

READINGS

There are two main texts used for Sections A-G: *Investments* (2002) by Bodie, Kane, and Marcus and *Options, Futures and Other Derivatives* (2003) by Hull. In addition, two chapters from *The Handbook of Fixed Income Securities* (2001) edited by Fabozzi are included. For those candidates wishing to gain a broader exposure to fixed income securities, Fabozzi has a wealth of additional material, although this additional material will not be tested.

Investments (Bodie, Kane, and Marcus) contains references to various Web sites. Candidates are not responsible for the identity of the Web sites, or the actual content of the Web sites, except to the extent the content is reproduced in the text. Candidates are also not responsible for any aspect of the boxes entitled "E-Investments:..." that are usually placed at or towards the end of a chapter.

It is suggested that the candidate cover the learning objectives in the order listed. For Exam 8, the appendices are included unless specifically excluded.

There are various numeric tables scattered throughout the readings, illustrating actual observations or hypothetical examples. Candidates are not responsible for the actual numeric values.

A. Financial Markets and Instruments

Range of weight for Section A: 0-5 percent

This section provides candidates with an overview of various financial markets and instruments.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the four principal classes of securities, their key characteristics and provide examples from each category. Range of weight: 0-5 percent	The four categories a. Money market b. Fixed income c. Equity d. Derivatives
2. Calculate Treasury bill yields on a bank discount, bond equivalent and effective basis and explain the relationship between these three yields. Range of weight: 0-5 percent	a. Use of par versus price as numerator b. Day count conventions c. Simple versus compound interest
3. Construct equity market indices using time series of prices. Range of weight: 0-5 percent	a. Price-weighted versus dollar-weighted b. Impact of splits, dividends, and composition changes
READINGS	
BKM Chapter 2 (For background, the candidate may wish to refer to Chapter 1, but no questions will be taken from Chapter 1.)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Describe the primary factors that impact interest rates on U.S. Government bonds. Range of weight: 0-5 percent	a. Supply and demand for funds b. Government fiscal and monetary policy
5. Determine pre-tax and post-tax real returns given nominal returns and inflation rates. Range of weight: 0-5 percent	a. Real and nominal returns b. Fisher effect
6. Describe the historical relationship between risk and return for different types of securities. Range of weight: 0-5 percent	a. Average return b. Standard deviation as risk measure
READINGS	
BKM Chapter 5 (For background, the candidate may wish to refer to Chapters 3 and 4, but no questions will be taken from Chapters 3 and 4.)	

B. Portfolio Theory

Range of weight for Section B: 5-10 percent

This section discusses the relationship between the risk and return for different combinations of risky and risk-free investments and discusses the impact that diversification has on this relationship. Candidates are introduced to the manner in which investors might select, from those available, a particular portfolio that best suits their individual preferences for risk and return.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Describe the relationship between risk and return and explain how utility measures are used to assess the trade-off between risk and return. Range of weight: 0-5 percent	a. Utility functions and utility maximization b. Risk aversion c. Mean-variance criterion
READINGS	
BKM Chapter 6	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Calculate expected return and standard deviation of return for portfolios consisting of risky and risk-free securities and identify optimal combinations of a risky asset and a risk-free asset for investors with different levels of risk aversion. Range of weight: 3-7 percent	a. Capital allocation line b. Risk aversion c. Complete portfolio
READINGS	
BKM Chapter 7	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Describe the impact of diversification on risk and return measures for portfolios of two or more risky assets and understand the limitations of diversification as a risk management tool. Range of weight: 0-5 percent	a. Expected return for portfolios of risky and risk-free assets b. Standard deviation of return for portfolios of two or more risky assets c. Standard deviation of return for portfolios of risky and risk-free assets d. Passive investment strategies e. Markowitz's Portfolio Selection Model and the Separation Property f. Insurance principle g. Fallacy of time diversification
READINGS	
BKM Chapter 8	

C. Equilibrium in Capital Markets

Range of weight for Section C: 8-12 percent

This section expands on the portfolio choice results of the previous section and examines how equilibrium market prices are ultimately determined, with a particular emphasis on prices of equity securities. Various equilibrium models are presented, including the Capital Asset Pricing Model, Arbitrage Pricing Theory and Index Models, along with empirical findings regarding their validity. The concept of market efficiency is presented to help candidates understand the factors that move market prices towards and away from the theoretical prices presented in these models.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the Capital Asset Pricing Model, including the major assumptions and examples of its applications and be able to use it to measure expected returns for risky securities with different risk characteristics. Range of weight: 3-7 percent	a. How equilibrium prices are determined in the market b. CAPM assumptions c. Capital market line d. Security market line e. CAPM f. Derivation of standard CAPM and zero-beta CAPM g. Liquidity issues
READINGS	
BKM, Chapter 9	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS

2. Use a Single Index Model to measure a security's return variance, CAPM Beta and other inputs into the Markowitz Portfolio Selection Model such as correlation and covariance.
 	
Range of weight: 0-5 percent
	a. Index Models and their relationship to CAPM
	b. Estimating beta using single index model
	c. Improving beta estimates:
	  • Industry index models
	  • Adjustments for statistical error
	  • Adjustments for forecast period
	d. Correlation and covariance estimates from index models

READINGS	
BKM, Chapter 10	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Use Arbitrage Pricing Theory to determine the expected return for a security given its factor sensitivities and the returns on the factor portfolios. Range of weight: 0-5 percent	a. Arbitrage b. Arbitrage Pricing Theory (APT) and its comparison to CAPM c. Estimating returns for APT factor portfolios based on the returns and factor sensitivities of other assets
READINGS	
BKM, Chapter 11	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Describe the concept of market efficiency, including the three major forms, and explain various observed anomalies in the U.S. stock market. Range of weight: 3-7 percent	a. Impact of technical analysis and fundamental analysis on market efficiency b. Event studies c. Equity premium puzzle d. Market anomalies including P/E effect, small-firm effect, neglected-firm effect, book-to-market effect, reversal effect
READINGS	
BKM, Chapter 12	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Describe the use of historical data to test the CAPM and APT, their statistical limitations and the major findings of various studies. Range of weight: 0-5 percent	a. Two-stage test of CAPM b. Statistical limitations, including actual versus expected returns, market index as market portfolio, measurement error, stochastic volatility c. Important tests of CAPM, including Miller and Scholes; Black, Jensen and Scholes; Fama and Macbeth d. Roll's Critique e. Chen, Roll and Ross tests of APT f. Fama and French's tests of CAPM and their implications.
READINGS	
BKM, Chapter 13	

D. Fixed Income Securities

Range of weight for Section D: 18-22 percent

This section covers the features of various fixed income securities, including U.S. Government Bonds, Corporate Bonds and Mortgage-Backed Securities, including the term structure of interest rates and a particular emphasis on how the values of these securities are determined.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain and give examples of various types of fixed income securities, including unique aspects of each. Range of weight: 0-5 percent	Various types of fixed income instruments including: a. Treasury Notes and Bonds b. Corporate Bonds c. Preferred Stock d. Asset-Backed Securities e. Catastrophe Bonds f. International Bonds
READINGS	
BKM, Chapter 14 Fabozzi, Chapter 24	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Determine the quoted price, full price and yield to maturity of U.S. Treasury Bonds. Range of weight: 3-7 percent	a. Accrued interest b. Quoted versus Full Price c. Different yield measures – current yield, yield to maturity, yield to call, par yield d. Prices and yields for Zero Coupon Bonds e. Holding Period Returns
READINGS	
BKM, Chapter 14 Hull, Chapter 5	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Determine the promised or stated yield and effective yield for Corporate Bonds, taking into account default risk. Range of weight: 3-7 percent	a. Promised yield or stated yield b. Expected yield c. Default probability d. Default premium e. Bond issuance cohorts f. Default Loss g. Bond Mortality h. Marginal and Cumulative Mortality Rates for Bonds i. Promised versus Expected Yields
READINGS	
BKM, Chapter 14 Altman	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Describe the process used to rate the default risk on corporate bonds and the various mechanisms used to limit this risk to investors. Range of weight: 0-5 percent	a. Methods to estimate bond default probabilities, including Financial Ratios and Altman's Z-Score b. Bond indentures including, sinking funds, subordination, dividend restrictions, and collateral
READINGS	
BKM, Chapter 14	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Explain the four different Term Structure Theories. Range of weight: 0-5 percent	a. Four theories: • Expectations Hypothesis • Liquidity Preference Theory • Market Segmentation • Preferred Habitat b. Forward rate versus expected spot rate
6. Use U.S. Government Bond prices to measure the term structure and calculate spot rates and forward rates for different maturities and time periods. Range of weight: 3-7 percent	a. Determining Forward Rates from Spot Rates. b. Alternative methods for estimating the term structure of interest rates, including using zero-coupon bonds, coupon bonds and statistical approaches to measuring a discount function. c. Zero Coupon Curve using both continuous compounding and semi-annual compounding d. LIBOR Rates
READINGS	
BKM, Chapter 15 Hull, Chapter 5	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
7. Describe the historical default performance of U.S. corporate bonds and explain whether the default risk has been fairly reflected in the promised yields. Range of weight: 0-5 percent	a. Historical statistics of bond defaults and yields for various rating cohorts b. Explanations for excess historical default premiums, including overcompensation, other risk factors such as liquidity risk and reinvestment risk, overstated recovery rates, systematic default risk, investor constraints
READINGS	
Altman	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
8. Estimate the cash flows for Mortgage Pass Throughs, Collateralized Mortgage Obligations, and Stripped Mortgage Backed Securities under alternative assumptions regarding mortgage prepayment. Range of weight: 0-5 percent	a. Types of mortgages and mortgage backed securities b. Prepayment risk c. Cash flow characteristics and prepayment risk of various tranches of Collateralized Mortgage Obligations, IO's and PO's
READINGS	
Fabozzi, Chapter 24	

E. Futures, Forward and Swaps

Range of weight for Section E: 8-12 percent

This section covers in detail various derivative instruments, including futures, forwards, and swaps. The emphasis in each case is in understanding their cash flow characteristics, using the concept of arbitrage to determine the theoretical value of these securities, and managing financial risk through use of these financial instruments.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Use arbitrage arguments to determine equilibrium forward prices for non-dividend paying stocks, dividend paying stocks, currencies and commodities. Range of weight: 3-7 percent	a. Arbitrage b. Margins c. Short selling d. Forward prices e. Relationship between forward prices and expected future spot prices f. Cost of carry and convenience yields
READINGS	
Hull, Chapters 2 and 3 (excluding Appendix)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Determine the values of existing forward contracts and forward rate agreements. Range of weight: 0-5 percent	a. Present value difference of forward price and the delivery price of an existing forward contract b. Continuously compounded spot rates and forward rates

READINGS
Hull, Chapter 3 (excluding Appendix)
Hull, Chapter 5

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Use forward and/or futures contracts to hedge the future purchase or sale of an asset. Range of weight: 0-5 percent	a. Long hedge versus short hedge b. Arguments for and against hedging c. Optimal hedge ratio d. Basis Risk
READINGS	
Hull, Chapter 4	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Explain how Treasury Bond Futures contracts are quoted and the unique aspects of the delivery feature of these contracts, including how the cash price is determined for any particular delivery bond. Range of weight: 0-5 percent	a. Cash price of delivery bond b. Cash futures price versus quoted futures price c. Cheapest to deliver bond d. Wild card play e. Conversion factors for Treasury bond futures
READINGS	
Hull, Chapter 5	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Use Interest Rate Swaps or Currency Swaps to alter the interest rate sensitivity or exchange rate sensitivity of an asset or a liability. Range of weight: 0-5 percent	a. Swap cash flow mechanics b. Role of financial intermediary c. Swap terms, including notional amount, swap rate, day count conventions, business day conventions d. Comparative advantage argument for swaps
6. Determine the value of an existing interest rate swap and the equilibrium swap rate. Range of weight: 0-5 percent	a. Swap rate b. Value as exchange of bonds c. Value as series of forward agreements
READINGS	
Hull, Chapter 6	

F. Options

Range of weight for Section F: 18-22 percent

This section covers options in detail. The emphasis is in understanding their cash-flow characteristics, how to use the concept of arbitrage to determine the theoretical value of these securities, and how they can be used to manage financial risk. Various valuation models are presented and used to determine the values of a variety of options.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the fundamental aspects of put and call options on stocks, including how they are traded and quoted, key contract provisions, and their payoffs at maturity (alone and in combination with other assets and options). Range of weight: 0-5 percent	a. Effect of cash dividends, stock dividends and stock splits on stock option contracts. b. Wash sale rules, constructive sale rules and tax planning. c. Key determinants of the value of put and call options, including underlying asset price, exercise price, term to maturity, risk free rate and volatility of underlying asset price d. Payoff and profit diagrams for different trading strategies involving options e. Early exercise of American puts and calls
READINGS	
Hull, Chapters 7, 8, and 9	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Use Put-Call Parity to determine the prices of European Put and Call Options and to identify arbitrage opportunities. Range of weight: 0-5 percent	a. Arbitrage b. Put-call parity for European options c. Use of short selling to lock in arbitrage profits d. Effect of dividends on put-call parity
READINGS	
Hull, Chapter 8	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Value European and American Put and Call options using the Binomial Model or Risk Neutral Valuation Model. Range of weight: 3-7 percent	a. Single period and multi-period binomial stock price trees b. Selecting *u* and *d* parameters for the binomial option pricing model based on the stock volatility c. Risk neutral valuation method d. Risk neutral probabilities e. Early exercise of American options
READINGS	
Hull, Chapter 10	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Value European Puts and Calls using the Black-Scholes Option Pricing Model for dividend and non-dividend paying stocks, indices, currencies, and futures contracts. Range of weight: 3-7 percent	a. Geometric Brownian Motion as a model for stock prices b. Estimation of volatility for option pricing purposes and implied volatility c. Put-call parity d. Methods for valuing European and American call options on dividend paying stocks, including Black's approximation for American options e. Black Model for valuing futures options
READINGS	
Hull, Chapters 11 (excluding Appendix), 12 (excluding Appendices), and 13 (excluding Appendices)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Explain the impact that various real-world deviations from the standard Black-Scholes assumptions would have on the accuracy of the Black-Scholes Option Price. Range of weight: 0-5 percent	Impact of: a. Changes in volatility b. Jumps in asset prices c. Changes in interest rates d. Borrowing penalties e. Short-selling restrictions f. Trading costs g. Taxes h. Dividends i. Takeovers
READINGS	
Hull, Chapter 12 (excluding Appendices) Black	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Describe the insights of the Black-Scholes-Merton Differential Equation and use it to demonstrate that a particular function is a valid formula for the price of a derivative security. Range of weight: 0-5 percent	a. Ito's Lemma b. Black-Scholes-Merton Differential Equation c. Riskless portfolio
7. Describe how the Black-Scholes model would be adjusted to determine the value of Warrants. Range of weight: 0-5 percent	a. Black-Scholes Model b. Adjustments for new shares issued c. Iterative process to value warrants
READINGS	
Hull, Chapter 12 (excluding Appendices)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
8. Determine the value of bonds with embedded put or call features using a Binomial Interest Rate Tree. Range of weight: 3-7 percent	a. Binomial interest rate tree for short rate b. Calibrating a binomial interest rate tree using U.S. Government bonds c. Option-adjusted spread
READINGS	
Fabozzi, Chapter 34	

G. International Securities

Range of weight for Section G: 0-5 percent

This section introduces the candidate to the arguments for and against expanding an investor's security selection universe to include international securities.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Explain the reasons for and against investing in international securities. Range of weight: 0-5 percent	a. Techniques for Investing Internationally b. Calculation of World Market Indices c. Exchange Rate Risk

H. Asset-Liability Management

Range of weight for Section H: 5-10 percent

This section introduces the candidate to factors that impact the price sensitivity of fixed income securities and presents various ways in which a portfolio manager might manage the interest rate and cash flow risk in a portfolio of these instruments. This is extended to include a firm's liabilities, as well as its assets, along with strategies to manage the associated net interest rate and cash flow risks.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Calculate the Macaulay Duration, Modified Duration and Convexity of a bond (or other fixed income security) for various compounding frequencies (*semiannual, annual, continuous*) and use these risk measures to estimate the percentage change in bond price for a given change in the bond's yield to maturity. Range of weight: 0-5 percent	a. Macaulay duration b. Modified duration c. Effective duration d. Convexity e. Interest rate risk f. Macaulay duration of loss reserves, equity securities, and property-casualty insurance company surplus
2. Describe how to use various immunization strategies, including Net Worth Immunization, Target Date Immunization, Cash Flow Matching and Contingent Immunization, to manage interest rate risk and cash flow risk in a bond portfolio and demonstrate the effectiveness of each strategy under different interest rate scenarios. Range of weight: 3-7 percent	a. Net worth immunization b. Target date immunization c. Cash flow matching d. Contingent immunization e. Use of interest rate swaps, mortgage-backed securities, and other derivative securities to manage interest rate risk for a bond portfolio
READINGS	
BKM, Chapter 16 Hull, Sections 5.13 and 5.14 Feldblum Noris (excluding sections I, II, V, and VI)	

I. Financial Risk Management

Range of weight for Section I: 13-17 percent

This section goes beyond the treatment of Asset-Liability Management in Section H to include other sources of financial risk and addresses the theoretical basis for financial risk management. Measures of the price sensitivity of derivative securities and the use of these instruments to manage financial risk are presented. Other measures of financial risk, such as Value at Risk and the Expected Policyholder Deficit, and their uses are presented.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Calculate the sensitivity of an option price to various parameters, including the stock price (delta and gamma), volatility (vega), time (theta), and interest rate (rho). Range of weight: 0-5 percent	a. Option Greeks including delta, gamma, vega, theta and rho
2. Demonstrate how to delta, gamma and vega hedge a portfolio of stocks and options. Range of weight: 3-7 percent	a. Strategies for managing risk of written option contracts – do nothing, cover, stop loss, delta hedging b. Delta hedging c. Gamma hedging d. Vega hedging e. Delta, gamma, and vega of stocks, futures, and forwards f. Using futures or forwards to delta hedge efficiently g. Portfolio insurance
READINGS	
Hull, Chapter 14 (excluding Appendix)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Calculate the Value at Risk (VaR) for a portfolio containing a single stock, multiple stocks, fixed income securities, or options. Range of weight: 3-7 percent	a. VaR definition b. Analytical VaR for stocks c. Analytical VaR for bonds using duration d. Cash flow mapping procedure for bonds e. Analytical VaR for options, including the use of the option gamma to improve accuracy
READINGS	
Hull, Chapter 16 (excluding Appendix 16B)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Describe alternative ways to estimate the VaR besides analytical calculations. Range of weight: 0-5 percent	a. Alternative methods including Monte Carlo simulation, historical simulation, stress testing, and back testing
READINGS	
Hull, Chapter 16 (excluding Appendix 16B) Culp, Miller and Neves (excluding Appendix)	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Describe the limitations of VaR for non-financial firms and the advantages of alternatives such as Cash Flow Risk, Risk-Based Capital and Shortfall Risk. Range of weight: 0-5 percent	a. Examples of firms experiencing large losses due to poor financial risk management, including Procter and Gamble, Barings, Orange County, Metallgesellschaft and Daimler Benz b. Cash Flow Risk c. Risk-Based Capital d. Shortfall Risk

READINGS
Culp, Miller and Neves (excluding Appendix)
Butsic

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
6. Describe how Financial Risk Management can enhance the value of a firm. Range of weight: 0-5 percent	Effect of risk management on: a. Bankruptcy costs b. Taxes c. Payments to stakeholders d. Access to capital for new investments e. Capital structure f. Management incentives
READINGS	
Stulz Gorvett Butsic	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
7. Calculate the Expected Policyholder Deficit (EPD) for an insurance policy or line of business and determine the capital required to maintain a constant EPD Ratio when adding this new policy or line of business to an existing portfolio of risks. Range of weight: 0-5 percent	a. Expected Policyholder Deficit (EPD) b. EPD ratio
READINGS	
Butsic	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
8. Evaluate capital adequacy and risk-adjusted profitability for a property-casualty company using the risk-adjusted return on capital (RAROC) framework. Range of weight: 0-5 percent	a. Required (or economic) capital including difference from property-casualty available equity capital b. The four steps in implementing the property-casualty RAROC conceptual framework c. Major types of property-casualty asset and liability risks d. The five insights gained from the study
READINGS	
Nakada et al.	

J. Valuation

Range of weight for Section J: 5-10 percent

This section covers the methods used to determine the theoretical value of equity securities and covers issues associated with the valuation of property and casualty insurance companies.

Learning Objectives	Knowledge Statements

1. Value the equity of a firm based on its expected future cash flows and/or reported financial variables.
 	
Range of weight: 3-7 percent
	a. Balance sheet methods
	b. Dividend discount model, using no growth, constant growth, or two-stage growth assumptions.
	c. Estimating growth rates based on dividend payout ratios and return on equity
	d. Terminal values
	e. Present value of growth opportunities (PVGO)
	f. Comparative valuation ratios including price-earnings, price-sales, price-book, price-cash flow
	g. Relationship between the dividend discount model and the price-earnings (P/E) ratio
	h. Impact of inflation on P/E ratio and on real rate of return
	i. Valuation of entire firm based on free cash flow:
	   • Value of firm versus value of equity
	   • Interest tax shields
	   • Firm beta versus equity beta

READINGS	
BKM, Chapter 18	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Determine the appraisal value of a property-casualty insurance company by calculating its adjusted net worth, appraisal value of existing business, and appraisal value of future business capacity. Range of weight: 0-5 percent	a. Adjusted net worth b. Appraisal value of existing business c. Appraisal value of future business capacity d. Valuation considerations according to Actuarial Standard of Practice No.19 and "Statement of Principles Regarding Property and Casualty Valuations"
READINGS	
ASOP 19 CAS Principles BKM, Chapter 18	

Complete Text References for Exam 8

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice, No. 19, Actuarial Appraisals (Doc. No. 034)," 1991.	ASOP 19	J2	**W**
Altman, E.I., "Measuring Corporate Bond Mortality and Performance," *The Journal of Finance*, Volume 44, No. 4, September 1989, pp. 909-922.	Altman	D3, D7	**SK**

Citation	Abbreviation	Learning Objective	Source
Black, F., "How to Use the Holes in Black-Scholes," *The New Corporate Finance: Where Theory Meets Practice* (Third Edition), Chew, D.H., editor; McGraw-Hill/Irwin, 2001, Chapter 32, pp. 455-461.	Black	F5	**SK**
Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fifth Edition), McGraw-Hill/Irwin, 2002. Chapter or section citations are listed under the appropriate learning objective.	BKM	A1-6, B1-3, C1-5, D1-6, G, H1-2, J1-2	**L NEW**
Butsic, R.P., "Solvency Measurement for Property-Liability Risk-Based Capital Applications," *The Journal of Risk and Insurance*, Volume 61, No. 4 (December 1994), pp. 656-690.	Butsic	I5-7	**SK**
Casualty Actuarial Society, "Statement of Principles Regarding Property and Casualty Valuations" as adopted September 22, 1989, Casualty Actuarial Society.	CAS Principles	J2	**W**
Culp, C.L.; Miller, M.H.; and Neves, A.M.P., "Value at Risk: Uses and Abuses," *The New Corporate Finance: Where Theory Meets Practice* (Third Edition), Chew, D.H., editor; McGraw-Hill/Irwin, 2001, Chapter 33, pp. 462-471.	Culp, Miller, and Neves	I4-5	**SK**
Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), McGraw-Hill, 2001, Chapters 24 and 34.	Fabozzi	D1, D8, F8	**SK**
Feldblum, S., "Asset Liability Matching For Property/Casualty Insurers," *Valuation Issues, CAS Special Interest Seminar*, 1989, pp. 117-154.	Feldblum	H1-2	**W**
Gorvett, R.W., "Insurance Securitization: The Development of a New Asset Class," *Securitization of Risk*, Casualty Actuarial Society *Discussion Paper Program*, May 1999, pp. 133-173.	Gorvett	I6	**W**
Hull, J.C., *Options, Futures, and Other Derivatives* (Fifth Edition), Prentice Hall, 2003. Chapter or section citations are listed under the appropriate learning objective	Hull	D2, D5-6, E1-6, F1-7, H1-2, I1-4	**L NEW**
Nakada, P.; Shah, H.; Koyluoglu, H.U.; and Collignon, O., "P&C RAROC: A Catalyst for Improved Capital Management in the Property and Casualty Insurance Industry," *The Journal of Risk Finance*, Fall 1999.	Nakada et al.	I8	**SKU NEW**
Noris, P.D., "Asset/Liability Management Strategies for Property and Casualty Companies," Morgan Stanley, May 1985.	Noris	H1-2	**SK**
Stulz, R.M., "Rethinking Risk Management," *The New Corporate Finance: Where Theory Meets Practice* (Third Edition), Chew, D.H., editor; McGraw-Hill/Irwin, 2001, Chapter 29, pp. 411-427.	Stulz	I6	**SK**

Source Key

L   May be purchased from the publisher or bookstore or borrowed from the CAS Library.

NEW   Indicates new or updated material or modified citation.

SK   Represents material included in the 2004 CAS Study Kit.

SKU   Represents material included in the 2004 CAS Study Kit and the 2004 Update to the 2003 Study Kit.

W   Represents material that is available at no charge from the "Admissions" section of CAS Web Site (www.casact.org) under Syllabus Web Notes. (For those without access to the Internet, printed copies of the Web Notes are available for a fee.)

Publishers and Distributors

Contact information is furnished for those who wish to purchase the text references cited for Exam 8. Publishers and distributors are independent and listed for the convenience of candidates; inclusion does not constitute endorsement by the CAS.

ACTEX Publications (Mad River Books), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com.

Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.

Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fifth Edition), 2002, McGraw-Hill/Irwin, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Casualty Actuarial Society *Forum*, *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Chew, D.H., editor, *The New Corporate Finance: Where Theory Meets Practice* (Third Edition), 2001, McGraw-Hill/Irwin, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), 2001, McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Hull, J.C., *Options, Futures, and Other Derivatives* (Fifth Edition), 2003, Prentice Hall; telephone: (800) 374-1200; Web site: www.prenhall.com.

Journal of Risk and Insurance, The, American Risk and Insurance Association, 716 Providence Road, P.O. Box 3028, Malvern, PA 19355; telephone: (610) 640-1997; fax: (610) 725-1007; Web site: www.aria@cpcuiia.org.

Exam 9
Advanced Ratemaking, Rate of Return, and Individual Risk Rating Plans

Before commencing study for this four-hour examination, candidates should read the introduction and key to "Materials for Study" on page 29 of this *Syllabus* for important information about learning objectives, knowledge statements, readings, and the range of weights. Items marked with a bold **SK** or **SKU** constitute the 2004 CAS Exam 9 Study Kit that is available from the CAS Office for a cost of $23. Items marked with a bold **W** are available at no charge under Web Notes in the "Admissions" section of the CAS Web Site (www.casact.org). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2004 CAS Exam 9 Web Notes—from the CAS Office for a cost of $60. The 2004 Update to the 2003 Study Kit is available at a cost of $10 and includes only the items marked with a bold **SKU**. Information about Study Kits and Web Notes is available on page 26.

Please check the "Admissions" section of the CAS Web Site for any changes to the *Syllabus*.

Candidates for Exam 9 are expected to have already acquired considerable technical knowledge and practical experience in insurance ratemaking. This examination will assume a working knowledge of basic ratemaking and will deal with advanced problems that fall within the learning objectives. The ability to apply ratemaking knowledge and experience may be tested through questions dealing with problems for which there are no generally recognized solutions. To some degree, the examination will deal with the types of practical problems that a fully qualified actuary working in ratemaking should be able to solve.

The readings for Exam 9 should be read for illustrations of basic principles and theories, as well as insights into advanced ratemaking problems and their solutions. Some readings are included primarily for their historical significance or to illustrate unique solutions to a ratemaking problem.

A. Classification Ratemaking

Range of weight for Section A: 13-18 percent

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Identify possible rate classes. Range of weight: 0-5 percent	a. Characteristics of appropriate classes (Statement of Principles) b. Sampling techniques c. Credibility considerations
2. Measure the statistical significance of possible classes. Range of weight: 0-5 percent	a. Characteristics of appropriate classes (Statement of Principles) b. Sampling techniques c. Credibility considerations
READINGS	
AAA Bailey and Simon Cummins et al. Mahler Feldblum and Brosius	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Translate the class differences into price differences. Range of weight: 5-10 percent	a. Multidimensional relativities b. Credibility techniques

B. Cost of Layers of Risk (Excess and Deductible Rating)

Range of weight for Section B: 13-18 percent

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Apply frequency and severity distributions to determine expected losses by layer of insurance. Range of weight: 5-10 percent	a. Different descriptions of severity distributions: including severity distribution, ILFs, Loss Elimination Ratios (LERs) b. Properties of ILFs c. Interaction among inflation, changes in layer, and losses d. Methods of estimating frequency and severity distributions from losses

READINGS
Lee 1
Miccolis
Finger
Gillam and Snader 1

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Estimate aggregate loss distributions. Range of weight: 5-10 percent	a. Techniques to estimate aggregate loss distributions directly from aggregate data (e.g., Table M, Table L) b. Construction of an aggregate loss distribution from frequency and severity distributions

READINGS
Gillam and Snader 2
Lee 2
Skurnick
Gillam 1
Brosius

C. Pricing of Catastrophic Events

Range of weight for Section C: 0-5 percent

This section introduces the methods used to model losses due to catastrophic events in order to generate the catastrophe risk load.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Estimate the probability and potential cost of Catastrophic Events. Range of weight: 0-5 percent	a. Models used to estimate the probability and potential cost of catastrophic events

READINGS
Walters and Morin

D. Rate of Return, Risk Loads, and Contingency Provision

Range of weight for Section D: 30-35 percent

This section explores the relationship between insurance concepts (such as underwriting profits, premium-to-surplus ratios, and investment income) and financial concepts (such as interest rates, inflation rates, cost of capital, and risk premiums). The readings build on a background of finance as related to the insurance business and deal with specific techniques used by actuaries to develop an appropriate profit loading in insurance prices.

Because insurance claims are fortuitous, the loading for profit in rates may not be realized. The models discussed in Learning Objectives 1 and 2 tend to assume that insured events are predictable in time and amount. Some consideration should be made for uncertainty of claims, particularly where capacity is limited and/or sufficient diversification of exposure is impossible. Learning Objective 3 covers this.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Analyze rate of return. Range of weight: 10-15 percent	a. Composition of surplus b. Measures of return (including ROE, underwriting profit, IRR) • Advantages • Disadvantages • Perspectives of users b. Sources and types of data used for analysis including calendar year versus accident year
2. Estimate a rate in order to achieve a target rate of return. Range of weight: 10-15 percent	a. Composition of surplus b. Measures of return (including ROE, underwriting profit, IRR) • Advantages • Disadvantages • Perspectives of users c. Sources and types of data used for analysis including calendar year versus accident year

READINGS
McClenahan D'Arcy and Dyer Butsic Ferrari Robbin Roth Feldblum

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Determine risk load and contingency provision to be included in insurance rates. Range of weight: 10-15 percent	a. Theory underlying the risk load (including why a risk load is necessary and relationship between risk load and variability)

READINGS
Miccolis
Butsic
Ferrari
Roth
Feldblum
Bault
Mango

E. Individual Risk Rating

Range of weight for Section E: 33-38 percent

One of the important functions performed by an actuary is rating individual risks. Prior to Exam 9, most of the readings were addressed to group or classification risk rating. This part is intended to prepare candidates to design and manage an individual risk rating system.

Individual risk rating consists of two subsections:

1. Prospective rating, in which prior individual risk experience is used to adjust rates prospectively (also known as experience rating);

2. Retrospective and Loss Sensitive rating, in which the insured will pay an amount (in premium or retained loss) that depends on the experience after the policy has been written.

The readings range from those that discuss the theoretical foundation of individual risk rating to those that discuss the application of various rating plans. Candidates can be expected to apply these concepts in a creative and problem-solving manner.

Candidates are also expected to be knowledgeable in the application of individual risk rating plans currently in use and should anticipate answering questions in the manner of an insurance consultant for an insured.

Excerpts from the NCCI *Experience Rating Plan Manual for Workers Compensation and Employers Liability Insurance*, NCCI *Retrospective Rating Plan Manual for Workers Compensation and Employers Liability Insurance*, and ISO *Experience and Schedule Rating Plans Applicable to General Liability* will be provided with the examination. Candidates are not required to memorize the details, but will be expected to be able to use them during the examination. Since they will be included with the examination, candidates will not be allowed to bring copies of the documents into the examination room.

Prospective Rating (Range of weight: 13-18 percent)

The main idea of experience rating is to adjust an individual risk's rate to reflect the extent to which that risk's own experience identifies it as being different from other risks in the same class. The readings begin with principles and concepts, then move to a discussion of plans in current use.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
1. Adjust class rates based on individual risk exposure and experience. Range of weight: 5-10 percent	a. Actuarial principles and concepts underlying development of experience rating plans b. Credibility concepts (e.g., maximum single loss) c. Current NCCI and ISO experience rating plans d. Schedule rating

READINGS
Venter
Gillam 2
Gillam and Snader 1
NCCI 1
NCCI 2
ISO

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
2. Assess effectiveness of experience rating plans. Range of weight: 5-10 percent	a. Off-balance factors b. Evaluation techniques (e.g., quintile test)
READINGS	
Venter Gillam 2	

Retrospective and Loss Sensitive Rating (Range of weight: 15-20)

Retrospective rating allows adjustment of individual risk premium after policy expiration in response to actual loss and expenses associated with the policy. The retrospective rating plans currently in use adjust the premium up or down within limits selected in advance.

Excess and deductible rating is another method that allows the insured to retain loss and loss expense up to limits selected in advance. Instead of adjusting premium after policy expiration to achieve this goal, however, the insured is responsible for the retained portion of loss and loss expense.

Candidates should have a general knowledge and understanding of deductible and excess coverages, and the problems inherent in pricing these coverages for various lines. This section builds on the material covered in Section B, Cost of Layers of Risk.

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
3. Construct a retrospectively rated plan. Range of weight: 8-13 percent	a. Actuarial principles and concepts underlying the construction of a retrospective rating plan (e.g., balance principle, construction of table of insurance charges) b. NCCI retrospective rating plans
READINGS	
Gillam and Snader 2 Lee 2 Skurnick Brosius NCCI 3	

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
4. Analyze the elements of a loss sensitive rating plan. Range of weight: 3-8 percent	a. How the parameters and other elements of the plan affect the final price and potential profitability of product b. How the parameters and other elements of the plan affect cost and cash flow to insured

READINGS
Gillam and Snader 2
Lee 2
Skurnick
Fisher

LEARNING OBJECTIVES	KNOWLEDGE STATEMENTS
5. Calculate the cost of the layer of risk given the loss cost. Range of weight: 0-5 percent	a. How expenses vary by layer and policy provisions (combined or separate?) b. Large dollar deductible (LDD) and excess policy provisions c. Advantages of LDD and excess policies
READINGS	
Gillam and Snader 3	
Fisher	
Teng	

Complete Text References for Exam 9

Text references are alphabetized by the citation column.

Citation	Abbreviation	Learning Objective	Source
American Academy of Actuaries Committee on Risk Classification, "Risk Classification Statement of Principles," June 1980. (Available at no charge from the American Academy of Actuaries at (202) 223-8196 or on the Academy's Web Site at www.actuary.org.)	AAA	A1, A2	**W**
Bailey, R.A.; and Simon, L.J., "An Actuarial Note on the Credibility of Experience of a Single Private Passenger Car," *PCAS* XLVI, 1959, pp. 159-164. Including discussion of paper: Hazam, W.J., *PCAS* XLVII, 1960, pp. 150-152.	Bailey and Simon	A1, A2, A3	**W**
Bault, T., Discussion of Feldblum: "Risk Load for Insurers," *PCAS* LXXII, 1995, pp. 78-96. Candidates may wish to review the following articles as background to the above, although no questions will be directly drawn from them: Feldblum, S., "Risk Loads for Insurers," *PCAS* LXXVII, 1990, pp. 160-195, including discussions of paper: Philbrick, S.W., *PCAS* LXXVIII, 1991, pp. 56-63.	Bault	D3	**W** **NEW**
Brosius, J.E., "Table M Construction," CAS Study Note, 2002.	Brosius	B2, E3	**W**
Butsic, R.P., "Determining the Proper Interest Rate for Loss Reserve Discounting: An Economic Approach," *Evaluating Insurance Company Liabilities*, Casualty Actuarial Society *Discussion Paper Program*, 1988, pp. 147-188, excluding pp. 171-178.	Butsic	D1, D2, D3	**W** **NEW**
Cummins, J.D.; Smith, B.D.; Vance, R.N.; and VanDerhei, J.L., *Risk Classification in Life Insurance*, 1983, Kluwer Nijhoff Publishing, Chapter 3. Candidates are not responsible for mathematical proofs.	Cummins et al.	A1, A2	**SK**

Citation	Abbreviation	Learning Objective	Source
D'Arcy, S.P.; and Dyer, M.A., "Ratemaking: A Financial Economics Approach," *PCAS* LXXXIV, 1997. Only Sections 4, 6, and 8 will be directly tested, but the other sections may provide useful background.	D'Arcy and Dyer	D1, D2	**W**
Feldblum, S., "Pricing Insurance Policies: The Internal Rate of Return Model," CAS Study Note, May 1992. Only Sections 1, 3, and 6 will be directly tested, but the other sections may provide useful background.	Feldblum	D1, D2, D3	**W**
Feldblum, S.; and Brosius, J.E., "The Minimum Bias Procedure, A Practitioner's Guide," CAS Study Note, April 2003.	Feldblum and Brosius	A1, A2, A3	**W** **NEW**
Ferrari, J.R., "The Relationship of Underwriting, Investment, Leverage, and Exposure to Total Return on Owners' Equity," *PCAS* LV, 1968, pp. 295-302. Includes discussion: Balcarek, R.J., *PCAS* LVI, 1969, pp. 58-60.	Ferrari	D1, D2, D3	**W**
Finger, R.J., "Estimating Pure Premiums by Layer," *PCAS* LXIII, 1976, pp. 34-52. Including discussion of paper: Steeneck, L.R., *PCAS* LXIII, 1976, pp. 53-55.	Finger	B1	**W**
Fisher, G.K., "Pricing Aggregates on Deductible Policies," CAS Study Note, 2002.	Fisher	E4, E5	**W**
Gillam, W.R., "Retrospective Rating: Excess Loss Factors," *PCAS* LXXVIII, 1991, pp. 1-40. Candidates are not responsible for loss distribution formulae.	Gillam 1	B2	**W**
Gillam, W.R., "Workers' Compensation Experience Rating: What Every Actuary Should Know," *PCAS* LXXIX, 1992, Sections 1-5, pp. 215-239.	Gillam 2	E1, E2	**W**
Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part I.	Gillam and Snader 1	B1, E1	**W**
Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part II.	Gillam and Snader 2	B2, E3, E4	**W**
Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part III.	Gillam and Snader 3	E5	**W**
Insurance Services Office, Inc., *Experience and Schedule Rating Plans Applicable to General Liability*, ISO Circular GL-90-217 (Conversion to Loss Cost Basis). Excerpts from the ISO *Experience and Schedule Rating Plans Applicable to General Liability* will be provided with the exam. Candidates are not required to memorize the details, but will be expected to be able to use them on the exam. Since they will be included with the exam, candidates will not be allowed to bring copies of the documents into the examination room.	ISO	E1	**SK**

Citation	Abbreviation	Learning Objective	Source
Lee, Y.S., "The Mathematics of Excess of Loss Coverages and Retrospective Rating—A Graphical Approach," Sections 1-3, *PCAS* LXXV, 1988, pp. 49-64.	Lee 1	B1	**W**
Lee, Y.S., "The Mathematics of Excess of Loss Coverage and Retrospective Rating—A Graphical Approach," Section 4, *PCAS* LXXV, 1988, pp. 64-78. Candidates are not responsible for "Other Applications" on pp. 75-76.	Lee 2	B2, E3, E4	**W**
Mahler, H.C., "An Example of Credibility and Shifting Risk Parameters," *PCAS* LXXVII, 1990, pp. 225-282. Candidates will not be tested on the Appendices.	Mahler	A1, A2	**W**
Mango, D.F, "An Application of Game Theory: Property Catastrophe Risk Load," *PCAS* LXXXV, 1998, pp. 157-186. Exam questions will not be drawn from section 9.	Mango	D3	**W NEW**
McClenahan, C.L., "Insurance Profitability," *Actuarial Considerations Regarding Risk and Return in Property-Casualty Insurance Pricing*, Casualty Actuarial Society, 1999, Chapter 8.	McClenahan	D1, D2	**W**
Miccolis, R.S., "On the Theory of Increased Limits and Excess of Loss Pricing," *PCAS* LXIV, 1977, pp. 27-59. Including discussion of paper: Rosenberg, S., *PCAS* LXIV, 1977, pp. 60-73.	Miccolis	B1, D3	**W**
National Council on Compensation Insurance, *The 1998 Adjustment to the Experience Rating Plan: Your Guide to Understanding the Changes*.	NCCI 1	E1	**SK**
National Council on Compensation Insurance, *Experience Rating Plan Manual for Workers Compensation and Employers Liability Insurance* (as of March 1, 2002). Candidates are responsible for only the excerpted material. Excerpts from the NCCI *Experience Rating Plan Manual for Workers Compensation and Employers Liability Insurance* will be provided with the examination. Candidates are not required to memorize the details, but will be expected to be able to use them on the examination. Since they will be included with the examination, candidates will not be allowed to bring copies of the documents into the examination room.	NCCI 2	E1	**SKU NEW**
National Council on Compensation Insurance, *Retrospective Rating Plan Manual for Workers Compensation and Employers Liability Insurance* (as of July 1, 2002). Candidates are responsible for only the excerpted material. Exclude Part 2, Section III, on cancellation provisions. Excerpts from the NCCI *Retrospective Rating Plan Manual for Workers Compensation and Employers Liability Insurance* will be provided with the examination. Candidates are not required to memorize the details, but will be expected to be able to use them on the examination. Since they will be included with the examination, candidates will not be allowed to bring copies of	NCCI 3	E3	**SKU NEW**

the documents into the examination room.			

Citation	Abbreviation	Learning Objective	Source
Robbin, Ira, "The Underwriting Profit Provision," CAS Study Note, as updated in 1992.	Robbin	D1, D2	**W**
Roth, R., "Analysis of Surplus and Rate of Return Without Using Leverage Ratios," *Insurer Financial Solvency*, Casualty Actuarial Society *Discussion Paper Program*, 1992, Volume I, pp. 439-464.	Roth	D1, D2, D3	**W**
Skurnick, D., "The California Table L," *PCAS* LXI, 1974, pp. 117-140. Including discussion of this paper: Gillam, W.R., *PCAS* LXXX, 1993, pp. 353-365.	Skurnick	B2, E3, E4	**W**
Teng, M.T.S., "Pricing Workers' Compensation Large Deductible and Excess Insurance," Casualty Actuarial Society *Forum*, Winter 1994, pp. 413-437.	Teng	E5	**W**
Venter, G.G., "Experience Rating—Equity and Predictive Accuracy," *NCCI Digest*, April 1987, Volume II, Issue I, pp. 27-35. (Pages are shown as 1-9 in the Study Kit version.)	Venter	E1, E2	**SK**
Walters, M.A.; and Morin, F., "Homeowners Ratemaking Revisited (Use of Computer Models to Estimate Catastrophe Loss Costs)," *PCAS* LXXXIV, 1997, pp. 1-43.	Walters and Morin	C1	**W NEW**

Source Key

L   May be purchased from the publisher or bookstore or borrowed from the CAS Library.

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SK   Represents material included in the 2004 CAS Study Kit.

SKU   Represents material included in the 2004 CAS Study Kit and the 2004 Update to the 2003 Study Kit.

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Casualty Actuarial Society *Forum*, *Foundations of Casualty Actuarial Science* (Fourth Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Cummins, J.D.; Smith, B.D.; Vance, R.N.; and VanDerhei, J.L., *Risk Classification in Life Insurance*, 1983, Kluwer Nijhoff Publishing, 101 Philip Drive, Norwell, MA 02061; telephone: (781) 871-6600; fax: (781) 871-6528.

Insurance Services Office, Inc., 545 Washington Boulevard, Jersey City, NJ 07310-1686; telephone: (800) 888-4476.

National Council on Compensation Insurance, 901 Peninsula Corporate Circle, Boca Raton, FL 33487; telephone: (800) NCCI-123.

SlideRule Books, 10 First Avenue East, Mobridge, SD 57601; telephone: (877) 407-5433 or (605) 845-5580; fax: (877) 417-5433 or (605) 845-7627; Web site: www.sliderulebooks.com.

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All	Actuarial Bookstore, P.O. Box 69, Greenland, NH 03840; telephone: (800) 582-9672 (U.S. only) or (603) 430-1252; fax: (603) 430-1258; Web site: www.actuarialbookstore.com.
7-U.S.	*Actuarial Digest*, P.O. Box 1127, Ponte Vedra, FL 32004.
5, 6	Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.
7-C	A.M. Best Canada Ltd., Suite 600, 133 Richmond Street West, Toronto, Ontario M5H 2I3, Canada; telephone: (416) 363-8266; Web site: www.ambest.ca.
5, 6, 7-C, 7-U.S.	American Institute for Chartered Property Casualty Underwriters, Order Department, P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.
1	Anton, H.; Bivens, I.; and Davis, S., *Calculus, Late Transcendentals Combined Version* (Seventh Edition), 2001, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.
7-U.S.	*Association Form of the Annual Statement Blanks*, Bowne Insurance Division, 800 Central Boulevard, Carlstadt, NJ 07072; telephone: (800) 223-3103.
7-C	Baer, M.G.; and Rendall, J.A., *Cases on the Canadian Law of Insurance* (Fifth Edition), 1995, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800 or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.
1	Bean, M.A., *Probability: The Science of Uncertainty with Applications to Investments, Insurance, and Engineering*, 2001, Brooks/Cole Publishing Company, a division of Thomson Learning, Order Department, 7625 Empire Drive, Florence, KY 41042; telephone: (800) 354-9706; Web site: http://training.thomsonlearning.com.
8	Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fifth Edition), 2002, Irwin McGraw-Hill, P.O. Box 182605, Columbus, OH 43218-2605; telephone: (800) 262-4729.

3	Bowers, N.L.; Gerber, H.U.; Hickman, J.C.; Jones, D.A.; and Nesbitt, C.J., *Actuarial Mathematics* (Second Edition), 1997, Society of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.
2	Brealey, R.A.; and Myers, S.C.*, Principles of Corporate Finance* (Seventh Edition), 2003, McGraw-Hill, P.O. Box 182605, Columbus, OH 43218-2605; telephone: (800) 262-4729.
7-C	Brown, C.; *Canadian Insurance Contracts Law in a Nutshell*, 1995, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800 or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.
7-C	Canadian Institute of Actuaries, Secretariat, Suite 820, 360 Albert Street, Ottawa, Ontario K1R 7X7, Canada; telephone: (613) 236-8196; fax: (613) 233-4552; Web site: www. actuaries.ca.
4-9	Casualty Actuarial Society *Forum*, *Foundations of Casualty Actuarial Science* (Fourth Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.
8	Chew, D.H., editor, *The New Corporate Finance: Where Theory Meets Practice* (Third Edition), 2001, McGraw-Hill/Irwin, P.O. Box 182605, Columbus, OH 43218-2605; telephone: (800) 262-4729.
9	Cummins, J.D.; Smith, B.D.; Vance, R.N.; and VanDerhei, J.L., *Risk Classification in Life Insurance*, 1983, Kluwer Nijhoff Publishing, 101 Philip Drive, Norwell, MA 02061; telephone: (781) 871-6600; fax: (781) 871-6528.
1	Edwards, C.H.; and Penney, D.E., *Calculus with Analytic Geometry* (Sixth Edition), 2002, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.
7-C	Ettlinger, K.H.; Hamilton, K.L.; and Krohm, G., *State Insurance Regulation* (First Edition), 1995, Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0770; telephone: (610) 644-2100.
8	Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), 2001, McGraw-Hill, P.O. Box 182605, Columbus, OH 43218-2605; telephone: (800) 262-4729.
7-C	Facility Association, 20 Richmond Street East, Suite 200, Toronto, Ontario M5C 2R9, Canada; telephone: (416) 863-1750 or (800) 268-9572; fax: (416) 868-0894.
6	Financial Accounting Standards Board, 401 Merret 7, P.O. Box 5116, Norwalk, CT 06856-5116; telephone: (203) 847-0700.
7-C	*Financial Institutions Act*, "Insurance Companies Act," Chapter 47, The Federal Publication, 388 King Street West, Toronto, Ontario M5V 1K2, Canada; telephone: (416) 860-1611.
7-C	Financial Services Commission of Ontario, 5160 Yonge Street, P.O. Box 85, North York, Ontario M2N 6L9, Canada; telephone: (416) 250-7250; fax: (416) 590-7070; Web site: www. ontarioinsurance.com.
1	Finney, R.L.; Demana, F.D.; and Waits, B.K., *Calculus: Graphic, Numerical, and Algebraic*, 1999, Addison-Wesley; telephone: (800) 922-0579.

4, 5, 6, 7-C, 7-U.S.	*Foundations of Casualty Actuarial Science* (Fourth Edition), 2001, Casualty Actuarial Society, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org.
1	Ghahramani, S., *Fundamentals of Probability* (Second Edition), 1999, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.
7-C	Greenan, J. (Ed.), *The Handbook of Canadian Pension and Benefit Plans* (Twelfth Edition), 2002, CCH Canadian Limited, 90 Shepherd East, Suite 300, North York, Ontario M2N 6X1, Canada; telephone: (416) 224-2248; fax: (800) 461-4131; Web site: www.ca.cch.com.
1	Hassett, M.; and Stewart, D., *Probability for Risk Management*, 1999, ACTEX Publications, 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com.
5	Health Insurance Association of America, *Group Life and Health Insurance—Part C* (Third Edition), 1992, HIAA Distribution Center, 9050 Junction Drive, Annapolis, MD 20701; telephone: (800) 828-0111 or (301) 317-4422; fax: (301) 206-9789; Web site: www.hiaa.org.
1	Hogg, R.V.; and Tanis, E.A., *Probability and Statistical Inference* (Sixth Edition), 2001, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.
8	Hull, J.C., *Options, Futures, and Other Derivatives* (Fifth Edition), 2003, Prentice Hall; telephone: (800) 374-1200; Web site: www.prenhall.com.
6, 7-C, 7-U.S.	Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.
7-C	Insurance Bureau of Canada, 240 Duncan Mill Road, Suite 700, Toronto, Ontario M3B 1Z4, Canada; telephone: (416) 445-5912; fax: (416) 445-2183.
7-U.S.	Insurance Expense Exhibit, Bowne Insurance Division, 800 Central Boulevard, Carlstadt, NJ 07072; telephone: (800) 223-3103.
6, 7-U.S.	Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.
5, 7-U.S., 9	Insurance Services Office, Inc., 545 Washington Boulevard, Jersey City, NJ 07310-1686; telephone: (800) 888-4476.
7-U.S.	*Journal of Insurance Regulation*, National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.
7-U.S., 8	*Journal of Risk and Insurance, The*, American Risk and Insurance Association, 716 Providence Road, P.O. Box 3028, Malvern, PA 19355; telephone: (610) 640-1997; fax: (610) 725-1007; Web site: www.aria@cpcuiia.org.
2	Kellison, S.G., *Theory of Interest*, 1991, Irwin/McGraw-Hill, P.O. Box 182605, Columbus, OH 43218-2605; telephone: (800) 262-4729.
7-C	Klar, L.N.; Linden, A.M.; Cherniak, E.A.; and Kryworuk, P.W., *Remedies in Tort*, 1997 (Release 6), Volume 4, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800 or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.

3, 4	Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.
2	Landsburg, S.E., *Price Theory and Applications* (Fifth Edition), 2002, International Thomson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.
1	Larson, R.E.; Hostetler, R.P.; and Edwards, B.H., *Calculus* (Seventh Edition), 2002, Houghton Mifflin Company, Customer Service, 181 Ballardvale Street, Wilmington, MA 01887; telephone: (800) 225-1464; fax: (978) 661-1326.
7-C	Linden, A.M., *Canadian Tort Law* (Seventh Edition), 2001, Butterworths, The Butterworths Group of Companies, 75 Clegg Road, Markham, Ontario L6G 1A1, Canada; telephone: (905) 479-2665; fax: (905) 479-2826; Web site: www.butterworths.ca.
7-U.S.	*NAIC Annual Statement Blanks, Property and Casualty* may be obtained from Bowne Insurance Division, 800 Central Boulevard, Carlstadt, NJ 07072; telephone: (800) 223-3103.
7-C, 7-U.S.	National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.
9	National Council on Compensation Insurance, 901 Peninsula Corporate Circle, Boca Raton, FL 33487; telephone: (800) NCCI-123.
7-U.S.	New York (State) Insurance Department, Publications Unit, Agency Building 1, Empire State Plaza, Albany, NY 12257; telephone: (518) 474-1203.
7-U.S.	New York (State) Laws, Statutes, etc., from New York Insurance Law may be obtained from the West Publishing Company, a division of International Thomson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.
7-C	Office of the Superintendent of Financial Institutions Canada, 255 Albert Street, Ottawa, Ontario K1A 0H2 Canada; telephone: (613) 990-7788; fax: (613) 952-8219; Web site: www.osfi-bsif.gc.ca.
4	Pindyck, R.S.; and Rubinfeld, D.L., *Econometric Models and Economic Forecasts* (Fourth Edition), 1998, Irwin McGraw-Hill, P.O. Box 182605, Columbus, OH 43218-2605; telephone: (800) 262-4729.
1, 2, 3, 4	Preliminary Actuarial Examinations, P.O. Box 95600, Chicago, IL 60694-5600; telephone: (847) 706-3500; fax: (847) 706-3599.
7-U.S.	Rejda, G.E., *Social Insurance and Economic Security* (Sixth Edition), 1999, Prentice-Hall, Inc.; telephone: (800) 374-1200.
1	Ross, S.M., *A First Course in Probability* (Sixth Edition), 2001, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.
3	Ross, S.M., *Introduction to Probability Models* (Eighth Edition), 2003, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.
3, 4	Ross, S.M., *Simulation* (Third Edition), 2002, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.

All	SlideRule Books, 10 First Avenue East, Mobridge, SD 57601; telephone: (877) 407-5433 or (605) 845-5580; fax: (877) 417-5433 or (605) 845-7627; Web site: www.sliderulebooks.com.
2, 3	Society of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.
1	Stewart, J., *Calculus: Concepts and Contexts* (Second Edition), 2001, Brooks/Cole Publishing Company, a division of Thomson Learning, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.
All	Texas Instruments, Attention: Order Entry, P.O. Box 650311, Mail Station 3962, Dallas, TX 75265; telephone: (800) 842-2737; Web site: www.ti.com.
2	Wachtel, P., "Macroeconomics," SOA Study Note 2-21-00, Society of Actuaries, 475 N. Martingale Road, Suite 600, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.