

# Notice to Candidates

Including Important Changes

## 1. New Calculator Policy

Beginning with the Spring 2001 examinations, the Texas Instruments TI-30X II calculator will be added to the list of acceptable calculators for all CAS examinations. The revised policy is:

“Electronic calculators will be allowed in the examination room for all examinations. Candidates may use the battery- or solar-powered models of the following Texas Instruments calculators: BA-35 (the official CAS/SoA calculator), TI-30X, TI-30Xa, or TI-30X II. The CAS/SoA logos are not required on the calculator. Candidates may use more than one of the approved calculators during the examinations. For those using the TI-30X II model, candidates will be required to show examination proctors that the memory has been cleared by displaying “MEM CLEARED” on the calculator screen prior to the start of the examination. Any unauthorized calculator brought to the examination center will be confiscated for the duration of the examination. Candidates may purchase calculators directly from: Texas Instruments, Attention: Order Entry, PO Box 650311, Mail Station 3962, Dallas, TX 75265; telephone: (800) 842-2737; Web site: [www.ti.com](http://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 may malfunction. It is not to be distributed to a candidate without a calculator or whose unauthorized calculator has been confiscated.”

## 2. New Web Notes and Revised Study Kits

Beginning with the Spring 2001 examinations, the CAS Study Kits will be divided into two parts. Material that had been included in the Study Kits and is copyrighted by the CAS is available free-of-charge in the Students’ Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)). These items are marked with a **W** in the list of readings. For those who cannot access the CAS Web Site, a printed version of these “Web Notes” will be available for sale from the CAS Office (see order form at the back of this *Syllabus*).

All other material that had been included in the traditional CAS Study Kits will remain in the new Study Kits (i.e., material not owned by the CAS but for which the CAS has been granted permission to include in the Study Kit). These items are marked with an **SK** in the list of readings and can be purchased from the CAS Office (see order form at the back of this *Syllabus*).

## 3. 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:

<b>Spring 2001</b>	<b>Registration Deadline</b>
Exams 1-4	April 1, 2001
Exams 5, 7, 8	March 22, 2001
<b>Fall 2001</b>	<b>Registration Deadline</b>
Exams 1-4	October 1, 2001
Exams 6, 9	September 20, 2001

### 4. Exams 1-4

Exams 1-4 are jointly administered by the Casualty Actuarial Society and the Society of Actuaries through Preliminary Actuarial Examinations. Details are available in this *Syllabus* as well as the Society of Actuaries' *Catalog*. The registration form for Exams 1-4, as well as the order form for study notes, will be available in the Students' Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)) or from the CAS Office.

### 5. Lost Candidate ID Numbers

In order 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.

### 6. Date of Examinations

The Spring 2001 CAS Examinations will be held in late April and May; the Fall 2001 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 reading lists. Any changes made after the publication of this *Syllabus* will be posted in the Students' Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)).

### 8. Obtaining Examination Booklet (Exams 5-9)

For Exams 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 \$2.31 for domestic mail in the U.S.

### 9. CAS Web Site

The *Syllabus of Examinations* is available in the Students' Corner of

the CAS Web Site ([www.casact.org](http://www.casact.org)). The “List of Passing Candidate Numbers,” *Future Fellows*, *Notice of Examinations*, updates to the 2001 *Syllabus*, and other important notices also will be posted in the Students’ Corner.

# 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 two classes of members, Fellows and Associates. Both classes require successful completion of examinations as described in this *Syllabus*.

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# INTRODUCTION

## 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 and 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 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, and 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 1-4 and the CAS-specific Exams 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 Student Liaison Committee**

The Student 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 students to voice individual or group concerns regarding the education and examination process. It also provides a means for an exchange of information between students and the admissions committees via *Future Fellows*, a newsletter that it publishes quarterly. Two candidates who are actively involved in the examination process serve as advisors to the committee.



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# 2001 CAS SYLLABUS SUMMARY

## Associateship Examinations

<b>Exam</b>	<b>Subjects</b>
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

<b>Exam</b>	<b>Subjects</b>
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 1-4 of the Casualty Actuarial Society and the Society of Actuaries.

† Candidates must specify their U.S. or Canadian specialty at the time of application.

# 2001 CAS EXAMINATION SCHEDULE

## Spring 2001

EXAM	DATE	ZONE	START TIME	FINISH TIME
1	05/23/2001*	All time zones	8:30 a.m.	11:30 a.m.
2	05/24/2001*	All time zones	8:30 a.m.	12:30 p.m.
3	05/17/2001*	All time zones	8:30 a.m.	12:30 p.m.
4	05/16/2001*	All time zones	8:30 a.m.	12:30 p.m.
5	04/30/2001	North and South America	9:30 a.m.	1:30 p.m.
5	04/30/2001	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
7	05/01/2001	North and South America	9:30 a.m.	1:30 p.m.
7	05/01/2001	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
8	05/02/2001	North and South America	9:30 a.m.	1:30 p.m.
8	05/02/2001	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.

## Fall 2001

EXAM	DATE	ZONE	START TIME	FINISH TIME
1	11/08/2001*	All time zones	8:30 a.m.	11:30 a.m.
2	11/07/2001*	All time zones	8:30 a.m.	12:30 p.m.
3	11/06/2001*	All time zones	8:30 a.m.	12:30 p.m.
4	11/05/2001*	All time zones	8:30 a.m.	12:30 p.m.
6	10/30/2001	North and South America	9:30 a.m.	1:30 p.m.
6	10/30/2001	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
9	10/31/2001	North and South America	9:30 a.m.	1:30 p.m.
9	10/31/2001	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.

**Note:** Starting time for examinations is local time for the specified zone.

\*Exams 1-4 are jointly administered by the Casualty Actuarial Society and the Society of Actuaries through Preliminary Actuarial Examinations. Final information for jointly administered examinations can be obtained from the CAS Web Site ([www.casact.org](http://www.casact.org)), the Casualty Actuarial Society at (703) 276-3100, or the Society of Actuaries at (847) 706-3500.

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# EXAMINATION RULES

## Registration

### Administration of Examinations

The CAS education structure has nine examinations and the Course on Professionalism. Exams 1-4 are jointly administered by the CAS and the Society of Actuaries (SoA) through Preliminary Actuarial Examinations. Exams 5-9 and the Course on Professionalism are exclusively administered by the CAS.

### 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](http://www.casact.org)). Payment must accompany each application to be valid. Applications must be received by the following deadlines:

<b>Spring 2001</b>	<b>Registration Deadline</b>
Exams 1-4	April 1, 2001
Exams 5, 7, 8	March 22, 2001
<b>Fall 2001</b>	<b>Registration Deadline</b>
Exams 1-4	October 1, 2001
Exams 6, 9	September 20, 2001

Please allow at least 10 working days for your 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 is received by the stated deadline**. Exceptions will not be made. Send applications as follows:

#### ***Exams 1-4***

Exams 1-4 are administered by Preliminary Actuarial Examinations for the CAS 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 Exams 1-4, 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 Students' Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)).] Send application with check or money order payment 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 800  
Schaumburg, IL 60173

Applications must be received prior to the published deadlines.

### ***Exams 5-9***

If paying in U.S. or Canadian funds by check, draft, or money order (payable to the "Casualty Actuarial Society"), send payment and application to:

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

If paying by credit card (MasterCard, Visa, American Express, Diners Club, or Discover), all fees will be processed in U.S. funds (please indicate fees accordingly). Send application with credit card payment and all overnight deliveries to:

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

Candidates will receive 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 1 for Spring examinations and August 1 for Fall examinations. This acknowledgment is the candidate's receipt of examination fees paid. Please retain this acknowledgment for tax purposes if needed.

Applications must be received prior to the published deadlines.

## **Fees**

Examination fees must be paid each time a candidate registers for an

examination. Payment options are described in the previous section, Filing of Applications. (A \$20 surcharge will be assessed for all returned checks. CAS Canadian fees include a \$4 service charge.)

The charts below show the examination fee schedules for Spring 2001 and Fall 2001 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 2001 Examination Fees

	Candidates		Candidates who are Full-Time Students	
	US\$	CAN\$	US\$	CAN\$
Exam 1	TBA	<i>See note below.</i>	TBA	<i>See note below.</i>
Exam 2	TBA		TBA	
Exam 3	TBA		TBA	
Exam 4	TBA		TBA	
Exam 5	\$400	\$599	\$320	\$480
Exam 7	\$400	\$599	\$320	\$480
Exam 8	\$400	\$599	\$320	\$480

**Note:** For Exams 1-4, candidates may submit the Canadian equivalent of all U.S. fees at the time of registration to Preliminary Actuarial Examinations (PAE).

### Fall 2001 Examination Fees

	Candidates		Candidates who are Full-Time Students	
	US\$	CAN\$	US\$	CAN\$
Exam 1	TBA	<i>See note above.</i>	TBA	<i>See note above.</i>
Exam 2	TBA		TBA	
Exam 3	TBA		TBA	
Exam 4	TBA		TBA	
Exam 6	\$450	\$674	\$360	\$540
Exam 9	\$450	\$674	\$360	\$540

### Other Fees

	US\$	CAN\$
Refund (Exams 1-4)	\$50	<i>See note.</i>
Refund (Exams 5-9)	\$60	\$93
Exam Center Outside U.S. or Canada (Exams 5-9)	\$40	\$64
Change of Exam Center	\$50	\$78
Special Exam Center	\$50	\$78
Translation Fee (Exams 5-9) <i>For each exam</i>	\$200	\$302

## Examination Centers

Examination centers are listed on the application. 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 prior to 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 prior to the examination.

### ***Ticket of Admission (Exams 1-4 Only)***

For Exams 1-4, Preliminary Actuarial Examinations will send each candidate: 1.) a Ticket of Admission which 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 prior to 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 5-9 outside the United States or Canada should include an additional fee of \$40 (\$64 Canadian). Requests must be made at least two months prior to the examination date.

## **Languages Other than English**

### ***Exams 1-4***

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

### ***Exams 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 prior to 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 1-4) or the CAS (for Exams 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 prior to the registration deadline.

## **Refunds**

### ***Exams 1-4***

Any candidate who submits an application for Exams 1-4 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, 2001 for the Spring Examinations or December 31, 2001 for the Fall Examinations. Refund requests may be sent via e-mail to [exams@soa.org](mailto: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 1-4 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 5-9***

Any candidate who submits an application for Exams 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, 2001 for the Spring Examinations or December 31, 2001 for the Fall Examinations. Refund requests may be sent via e-mail to [refund@casact.org](mailto:refund@casact.org) or by fax to (703) 276-3108. Late requests will not be considered. A fee of \$60 (\$93 Canadian) 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).



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# EXAMINATION RULES

## The Examination

### Introduction

The examinations for admission to the Casualty Actuarial Society are designed to establish the qualifications of candidates. The Examination Committee creates examinations 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.

It should be realized that while the examination questions will be largely based upon the textual material cited, they will not necessarily be drawn directly therefrom. The examinations will test not only candidates' knowledge of the subject matter, but also candidates' ability to apply that knowledge. In the development of *Syllabus* readings and examination questions, it is assumed that candidates are familiar with the material covered in earlier examinations. Therefore, it may be beneficial for candidates to take the exams in numerical order.

### 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 1-4, 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 to one hour before the examination is scheduled to begin. Candidates may not leave

until two hours after the start of the examination. For Exams 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 10). Examination answer sheets are not returned to candidates.

For Exams 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 \$2.31 for domestic mail in the U.S. Approximately one week after all examinations have been completed, a *preliminary* list of multiple-choice and true/false answers for Exams 5-9 will be posted in the Students’ Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)). Sample solutions for essay questions will not be available until they are published on July 31, 2001 for Spring Examinations and January 31, 2002 for Fall Examinations.

## Calculators

Electronic calculators will be allowed in the examination room for all examinations. Candidates may use the battery- or solar-powered models of the following Texas Instruments calculators: BA-35 (the official CAS/SoA calculator), TI-30X, TI-30Xa, or TI-30X II. The CAS/SoA logos are not required on the calculator. Candidates may use more than one of the approved calculators during the examinations. For those using the TI-30X II model, candidates will be required to show examination proctors that the memory has been cleared by displaying “MEM CLEARED” on the calculator screen prior to the start of the examination. **Any unauthorized calculator brought to the examination center will be confiscated for the duration of the examination.**

Candidates may purchase calculators directly from: Texas Instruments, Attention: Order Entry, PO Box 650311, Mail Station 3962, Dallas, TX 75265; telephone: (800) 842-2737; Web site: [www.ti.com](http://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 may malfunction. 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 not permitted.
3. Looking in the examination book before the signal to begin is given.
4. Marking or otherwise writing on the examination book or answer sheet before the signal 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 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 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 1-4], 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 1-4, no guessing adjustment is made to candidates' scores. Therefore, candidates will maximize their scores on the joint examinations by answering every question.

On Exams 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 one exception to this policy is for multiple-choice Exams 1-4. 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.

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# EXAMINATION RULES

## Grades and Accreditation

*The actual grading process is fairly similar for both the jointly administered Exams 1-4 and the CAS-specific Exams 5-9. The following provides details about CAS-specific Exams 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, a *preliminary* list of multiple-choice and true/false answers will be posted in the Students' Corner of the CAS Web Site ([www.casact.org](http://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/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 1-4 or to the CAS Office for Exams 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 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**

The goal when determining the pass mark is to maintain consistent standards of qualification for membership. 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 to achieve the desired consistency. 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. Raw scores and the pass mark are not provided to candidates.

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.

## **Examination Results**

Examination results are available approximately eight weeks after the examination date. After examination results are received at the CAS Office, a list of passing candidate ID numbers will be posted in the Students' Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)). Individual statements of examination results are mailed to candidates on the day that they are posted on the CAS Web Site.

For Exams 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 distributed.

**Note: 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 5-9**

Candidates who did not pass Exams 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.

## **Appeals for Exams 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 not later than July 31, 2001 for Spring Examinations, and January 31, 2002 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, 2001 for Spring Examinations and March 1, 2002 for Fall Examinations. When a valid appeal is received, it is reviewed by the part chair and a recommendation is made to the Examination Committee chair. The Examination Committee chair will respond based on the recommendation of the part chair.

## **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 through 7. Exams 1-4 are the same as the Society of Actuaries' Courses 1-4. Exam 7 is nation specific, covering United States 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/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

## **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 Fellows 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 published in the newsletter *Future Fellows*. 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/Institute examination credit earned through coursework except for those universities on the Faculty/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/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 that are jointly administered with the Society of Actuaries:

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

2. The CAS recognizes the examinations sponsored by the Institute of Actuaries in 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, including recognized actuarial organizations outside of the U.S. and Canada that have formal education requirements, but whose only means of qualification are through academic achievement. 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.



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# HINTS ON STUDY & 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 & 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 in 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 their full schedule and completing their 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 which 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 which 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 which 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 which 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 which 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 bumbles just as bad in parts of the examination as the first type of candidates—nevertheless succeed in passing the same examination. As in life itself it is also true of actuarial examinations, 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.



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# STUDY RESOURCES

## Study Notes for Exams 1-4

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 1-4 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.

Information about obtaining Study Notes (including the ISN) is available in the Students' Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)).

## Study Kits and Web Notes for Exams 5-9

Many required readings may be downloaded free-of-charge from the Students' Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)). These readings are listed as "Web Notes" in this *Syllabus*. 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, 2000. Order forms are available in the Students' Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)) or in the back of this *Syllabus*.

2001 Study Kits and Web Notes	Price	
	US\$	CAN\$
Exam 5 Study Kit	\$28	\$46
Exam 5 Web Notes	\$46	\$72

Exam 5 2001 Update to the 2000 Study Kit	\$5	\$11
Exam 6 Study Kit	\$18	\$31
Exam 6 Web Notes	\$49	\$77
Exam 7-Canada Study Kit	\$99	\$151
Exam 7-Canada Web Notes	\$17	\$29
Exam 7-Canada 2001 Update to the 2000 Study Kit	\$8	\$16
Exam 7-US Study Kit	\$41	\$65
Exam 7-US Web Notes	\$27	\$44
Exam 7-US 2001 Update to the 2000 Study Kit	\$5	\$11
Exam 8 Study Kit	\$10	\$19
Exam 8 Web Notes	\$23	\$38
Exam 9 Study Kit	\$20	\$34
Exam 9 Web Notes	\$47	\$74
Exam 9 2001 Update to the 2000 Study Kit	\$7	\$14

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 1-4*

Sample examination questions for Exams 1-4 are available in the Students' Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)). The sample examinations, illustrative solutions, and answer keys for Exams 1-4 are included in the complete set of Study Notes. (Order forms are available in the Students' Corner of the CAS Web Site.)

### *Exams 5-9*

Past copies (last three years) of Exams 5-9 with answers are available free-of-charge under Study Tools in the Students' Corner of the CAS Web Site. (CAS examinations prior to the 2000 education and examination structure are from examinations that covered similar material whenever possible.) 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-year Set of Examinations is available at a charge of \$25 (\$41 Canadian). Because sample answers are not available until July 31, 2001 for Spring Examinations and January 31, 2002 for Fall Examinations, the printed Set of Examinations will not be updated until after these dates.

Please use the white order forms provided inside the back cover of the *Syllabus*. **NO RETURNS. NO REFUNDS.**

Exams 5-9 will be posted in the Students' Corner of the CAS Web Site approximately one week after all CAS-specific 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 31, 2001 for Spring Examinations and January 31, 2002 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 be increased or decreased.

## CAS Web Site

The Students' Corner of the CAS Web Site ([www.casact.org](http://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/past examinations
- *Notice of Examinations*
- Any change regarding the examination
- Order forms for study materials
- Registration forms for all CAS examinations
- Student 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. To join a study group, go to the following page on the CAS Web Site: <http://www.casact.org/students/studygroups.cfm>. Those without Web access can join by sending an e-mail to [imailsrv@lists.casact.org](mailto: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 at <http://www.casact.org/students/studytools/index.htm> on the CAS Web Site. Please direct any questions to CAS Webmaster Janet Dauber at [jdauber@casact.org](mailto:jdauber@casact.org) with any questions.

## CAS Library

The CAS Library has available for loan all the books marked with an “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:

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

The CAS Office ships the requested book(s) in the United States 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 10¢ per day.

Books that are not available through the CAS Library may be obtained by contacting the organizations listed in the “Index to Text References” in this *Syllabus*.

## CAS Publications

CAS publications that are still in print may be purchased at the prices listed below. Prices include postage and handling for orders delivered in the U.S. and Canada. For deliveries outside the U.S. or Canada, add 50% to prices shown below. Canadian residents must add 7% for GST. Virginia residents

must add 4.5% sales tax. Bulk orders of 20 or more of any single publication will receive a 20% discount. Prepayment is required for all orders. Payment may be in U.S. or Canadian funds in the form of check, draft, or money order. Credit card payments (MasterCard, Visa, American Express, Diners Club, or Discover) will be processed in U.S. funds. Please use the white order form provided inside the back cover of the *Syllabus*. **Allow four to six weeks for delivery. NO RETURNS. NO REFUNDS.**

PUBLICATIONS	PRICES	
	US\$	CAN\$
<i>Proceedings of the Casualty Actuarial Society (PCAS)</i>		
Volume LXIX (1982)	\$50	\$78
Volume LXX (1983)	\$50	\$78
Volume LXXI (1984)	\$50	\$78
Volume LXXIII (1986)	\$50	\$78
Volume LXXIV (1987)	\$50	\$78
Volume LXXV (1988)	\$50	\$78
Volume LXXVI (1989)	\$50	\$78
Volume LXXVII (1990)	\$50	\$78
Volume LXXIX (1992)	\$50	\$78
Volume LXXXI (1994)	\$50	\$78
Volume LXXXII (1995)	\$50	\$78
Volume LXXXIII (1996)	\$50	\$78
Volume LXXXIV (1997)	\$50	\$78
Volume LXXXV (1998)	\$50	\$78
Volume LXXXVI (1999)	\$50	\$78
<i>Proceedings on CD-ROM (1960 to present)</i>	\$50	\$78
<i>Index to the Literature of the Casualty Actuarial Society</i>		
Volumes XXXI to XL (1944-1953)	\$1	\$5
Volume XLI to L (See 1963 <i>PCAS</i> )	In the 1963 <i>PCAS</i>	
Volumes LI to LXXX (1964-1993)	\$30	\$49
Volumes LXXXI to LXXXV (1994-1998)	\$30	\$49
CAS 2001 <i>Yearbook</i>	\$40	\$64
<i>CAS Discussion Paper Programs</i>		
1984-Financial Solvency	\$30	\$49
1991-International Topics—Global Insurance Pricing, Reserving, and Coverage Issues	\$30	\$49

PUBLICATIONS, Continued	PRICES	
	US\$	CAN\$
<i>CAS Discussion Paper Programs, Continued</i>		
1993-The Actuary as Business Manager	\$30	\$49
1996-Alternative Markets/Self Insurance	\$30	\$49
1997-Health Care Issues for Property/Casualty Insurers	\$30	\$49
1998-Dynamic Analysis of Pricing Decisions	\$30	\$49
1999-Securitization of Risk	\$30	\$49
2000-Insurance in the Next Century	\$30	\$49
Casualty Actuarial Society <i>Forum</i> (per volume)	@ \$30	@ \$49
<input type="checkbox"/> Fall 1987 <input type="checkbox"/> Winter 1997		
<input type="checkbox"/> Fall 1988 <input type="checkbox"/> Spring 1997		
<input type="checkbox"/> Spring 1989 <input type="checkbox"/> Summer 1997 (Vol. 1)		
<input type="checkbox"/> Fall 1989 <input type="checkbox"/> Summer 1997 (Vol. 2)		
<input type="checkbox"/> Winter 1991 <input type="checkbox"/> Winter 1998		
<input type="checkbox"/> Fall 1991 <input type="checkbox"/> Summer 1998		
<input type="checkbox"/> Spring 1992 <input type="checkbox"/> Fall 1998		
<input type="checkbox"/> Winter 1993 <input type="checkbox"/> Winter 1999		
<input type="checkbox"/> Summer 1993 <input type="checkbox"/> Spring 1999		
<input type="checkbox"/> Winter 1994 <input type="checkbox"/> Summer 1999		
<input type="checkbox"/> Spring 1994 <input type="checkbox"/> Fall 1999		
<input type="checkbox"/> Summer 1994 <input type="checkbox"/> Winter 2000		
<input type="checkbox"/> Winter 1996 <input type="checkbox"/> Summer 2000		
<input type="checkbox"/> Spring 1996 <input type="checkbox"/> Fall 2000		
<input type="checkbox"/> Summer 1996 <input type="checkbox"/> Winter 2001		
<i>Foundations of Casualty Actuarial Science</i> (Third Ed.)	\$75	\$116
Statement of Principles Regarding P&C Insurance Ratemaking	\$4	\$10
Statement of Principles Regarding P&C Loss and Loss Adjustment Expense Reserves	\$4	\$10
Statement of Principles Regarding P&C Valuations	\$4	\$10

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# MATERIALS FOR STUDY

## Introduction

The *Syllabus* presents material that casualty actuarial candidates should understand thoroughly and be able to apply professionally to actual casualty insurance situations. The examination process is designed to assure that each successful casualty actuarial candidate attains a satisfactory level of competence in the subject matter.

References to papers in the *Proceedings of the Casualty Actuarial Society (PCAS)* are considered to include all cited discussions of these papers, unless otherwise noted. All *Proceedings* papers referenced in this *Syllabus* are available free-of-charge in the Students' Corner of the CAS Web Site.

Information for ordering CAS Study Kits, sample examinations, Web Notes, and CAS publications, and for using the CAS Library, is provided in this *Syllabus* beginning on page 35.

A detailed identification of the text references can be found in the "Index to Text References" at the end of each section and at the end 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 an "L"), some must be obtained by contacting the organizations listed in the index.

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

## Key

- L** May be borrowed from the CAS Library.
- NEW** Indicates new/updated material or modified citation.
- SK** Represents material included in the 2001 CAS Study Kit.
- SKU** Represents material included in the 2001 CAS Study Kit *and* the Update to the 2000 Study Kit.
- W** Represents material that is available free-of-charge from the CAS Site at [www.casact.org](http://www.casact.org). (For those without access to the Int printed copies of the "Web Notes" are available.)

**Associateship Examinations**

Exam 1—Mathematical Foundations of Actuarial Science

Exam 2—Interest Theory, Economics, and Finance

Exam 3—Actuarial Models

Exam 4—Actuarial Modeling

Exam 5—Introduction to Property and Casualty Insurance and Ratemaking

Exam 6—Reserving, Insurance Accounting Principles, and Reinsurance

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

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

**Fellowship Examinations**

Exam 8—Investments and Financial Analysis

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



# Associateship Examinations

## Exam 1 Mathematical Foundations of Actuarial Science

This three-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 35.

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;
- Vector-valued functions (polar coordinates, parameterized curves);
- General probability (set functions, basic axioms, independence);
- Bayes' Theorem;
- Univariate probability distributions (probabilities, moments, variance, mode, percentiles, transformations); and
- 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 provided to candidates at the time of the examination.

### 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 is expected to be familiar with the concepts introduced in the study note in Section C.

## A. Calculus

Anton, H., *Calculus: A New Horizon* (Sixth Edition), 1999, John Wiley and Sons.

Edwards, C.H.; and Penney, D.E., *Calculus with Analytic Geometry* (Fifth Edition), 1997, Prentice-Hall.

Hughes-Hallett, D.; Gleason, A.M.; and McCallum, W.G., *Calculus: Single and Multivariable* (Second Edition), 1998, John Wiley and Sons.

Thomas, G.B.; and Finney, R.L., *Calculus and Analytic Geometry* (Ninth Edition), 1996, Addison-Wesley.

## B. Probability

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* (Fifth Edition), 1998, Prentice-Hall, Chapters 1-8.

## C. Risk and Insurance

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

“Risk Management and Insurance,” Society of Actuaries Study Note 1-22-00. This is a supplemental reading for background only. No examination questions will be based on this reading.

## Index to Text References for Exam 1

The following information is furnished for those who wish to purchase the text references cited for Exam 1.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: [www.actuarialbookstore.com](http://www.actuarialbookstore.com).

Anton, H., *Calculus: A New Horizon* (Sixth Edition), 1999, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

Edwards, C.H.; and Penney, D.E., *Calculus with Analytic Geometry* (Fifth Edition), 1997, Prentice-Hall, Inc.; telephone:

(800) 374-1200 or (515) 284-6751.

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](mailto: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.

Hughes-Hallett, D.; Gleason, A.M.; and McCallum, W.G., *Calculus: Single and Multivariable* (Second Edition), 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](mailto:retail@actexmadriver.com).

“Risk and Insurance” (SN 1-21-00) and “Risk Management and Insurance” (SN 1-22-00), Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: [www.soa.org](http://www.soa.org).

Ross, S.M., *A First Course in Probability* (Fifth Edition), 1998, 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](http://www.sliderulebooks.com).

Thomas, G.B.; and Finney, R.L., *Calculus and Analytic Geometry* (Ninth Edition), 1996, Addison-Wesley; telephone: (800) 922-0579.

## 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 35.

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.

### Learning Objectives

- A. Economics
  - I. 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; and
      - 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, also 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; and
  - 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; and
  - 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; and
  - 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 and the time required to accumulate a given amount or repay a given loan amount; and
  - 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, 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; and
  - 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/short term financing policies on capital structure; and
  - 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; and
  - Valuation of basic options.

Note: Specific textbook readings are listed to demonstrate the concepts and material to be covered. The intention is not to focus on particular texts. A table of values for the normal distribution will be provided to candidates at the time of the examination.

## **A. Economics**

### **READINGS**

Landsburg, S.E., *Price Theory and Applications* (Fourth Edition), 1999, International Thompson Publishing. [Use the same chapters in the third edition.] Chapters: 1, Supply, Demand, and Equilibrium; 2, Prices, Costs and Gains from Trade; 3, Behavior of Consumers; 4, Consumers in Marketplace; 5, Behavior of Firms; 7, Competition; 8, Welfare Economics and Gain from Trade; 9, Knowledge and

Information (9.3 only—Adverse Selection and Moral Hazard); 10, Monopoly; 11, Market Power, Collusion and Oligopoly; and 14, Common Property and Public Goods.

Wachtel, P., “Macroeconomics,” Society of Actuaries Study Note 2-21-00.

## **B. Interest Theory and Finance**

### **READINGS**

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, 3.10); 4, More General Annuities; 5, Yield Rates (excluding 5.7-5.9); 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* (Sixth Edition), 2000, McGraw-Hill, Chapters: 1, Why Finance Matters; 4, The Value of Common Stocks; 5, Why 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, Organizing Capital Expenditure and Evaluating Performance Afterward; 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, Interactions of Investment and Financing Decisions; 20, Corporate Liabilities and the Valuation of Options; 21, Applications of Option Pricing Theory; and 28, Analyzing Financial Performance.

### **ALTERNATIVE TEXTS**

#### **Finance**

Ross, S.A.; Westerfield, R.W.; and Jaffe, J., *Corporate Finance* (Fifth Edition), 1999, McGraw-Hill Inc.

Brigham, E.F.; Gapenski, L.C.; and Ehrhardt, M.C., *Financial Management* (Ninth Edition), 1999, Harcourt Brace College Publishers.



## Interest Theory

Broverman, S.A., *Mathematics of Investment and Credit* (Second Edition), 1996, Mad River Books.

Parmenter, M.M., *The Theory of Interest and Life Contingencies with Pension Applications: A Problem-Solving Approach*, 1999, Mad River Books.

## Index to Text References for Exam 2

The following information is furnished for those who wish to purchase the text references cited for Exam 2.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: [www.actuarialbookstore.com](http://www.actuarialbookstore.com).

Brealey, R.A.; and Myers, S.C., *Principles of Corporate Finance* (Sixth Edition), 2000, McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Brigham, E.F.; and Gapenski, L.C., *Financial Management* (Ninth Edition), 1999, Harcourt Brace College Publishers, 6277 Sea Harbor Drive, Orlando, FL 32887; telephone (800) 245-8744.

Broverman, S.A., *Mathematics of Investment and Credit* (Second Edition), 1996, Mad River Books (A division of ACTEX Publications), 140 Willow Street, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: [retail@actexmadriver.com](mailto:retail@actexmadriver.com).

Kellison, S.G., *Theory of Interest*, 1991, Irwin/McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Landsburg, S.E., *Price Theory and Applications* (Fourth Edition), 1999, International Thompson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.

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](mailto:retail@actexmadriver.com).

Parmenter, M.M., *The Theory of Interest and Life Contingencies with Pension Applications: A Problem-Solving Approach* (Revised Edition), Mad River Books (A division of ACTEX Publications), 140 Willow Street, 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.A.; Westerfield, R.W.; and Jaffe, J., *Corporate Finance* (Fifth Edition), 1999, McGraw-Hill Inc., 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

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](http://www.sliderulebooks.com).

Wachtel, P., "Macroeconomics," Study Note 2-21-00, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: [www.soa.org](http://www.soa.org).

## Exam 3

### Actuarial Models

This four-hour multiple-choice examination is administered by Preliminary Actuarial Examinations and is identical to SoA Course 3. Information about Study Notes is available on page 35.

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. A 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, 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.

Five textbooks are recommended for this examination. Three of them will also be used for Exam 4. The texts are: *Actuarial Mathematics* by N.L. Bowers, H.U. Gerber, J.C. Hickman, D.A. Jones, and C.J. Nesbitt (1997); *Survival Analysis* by J.P. Klein and M.L. Moeschberger (1997); *Loss Models: From Data to Decisions* by S.A. Klugman, H.H. Panjer, and G.E. Willmot (1998); *Introduction to Probability Models* by S.M. Ross (2000); and *Simulation* by S.M. Ross (1997).

### Learning Objectives

#### *Understanding Actuarial Models*

The candidate is expected to understand the models and techniques listed below and to be able to apply them 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 course. The candidate is expected to be able to:

1. Explain what a mathematical model is and, in particular, what an actuarial model can be.
2. Discuss the value of building models for such purposes as: forecasting, estimating the impact of making changes to the modeled situation, estimating the impact of external changes on the modeled situation.
3. Identify the models and methods available, and understand the difference between the models and the methods.

4. Explain the difference between a stochastic and a deterministic model and identify the advantages/disadvantages of each.
5. Understand that all models presented (e.g., survival models, stochastic processes, aggregate loss models) have the same structure.
6. Formulate a model for the present value, with respect to an assumed interest rate structure, of a set of future contingent cash flows. The model may be stochastic or deterministic.
7. Determine the characteristics of the components and the effects of changes to the components of the model in 6. Components include:
  - A deterministic interest rate structure;
  - A scheme for the amounts of the cash flows;
  - A probability distribution of the times of the cash flows; and
  - The probability distribution of the present value of the set of cash flows.
8. 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.
  - Principles include: equivalence, exponential, standard deviation, variance, and percentile.
  - Models include: present value models based on 9-12 below.
  - Applications include: insurance, health care, credit risk, environmental risk, consumer behavior (e.g., subscriptions), and warranties.
9. Characterize discrete and continuous univariate probability distributions for failure time random variables in terms of the life table functions,  $l_x$ ,  $q_x$ ,  $p_x$ ,  ${}_nq_x$ ,  ${}_np_x$ , and  ${}_m|_nq_x$ , the cumulative distribution function, the survival function, the probability density function and the hazard function (force of mortality), as appropriate.
  - 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.
10. Given the joint distribution of two failure times:
  - 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 9, 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 functions in 9 in the case in which the two failure times are independent.
  - Characterize the joint distribution of two failure times, the joint life status and the last survivor status using the common shock model and using copulas.
11. Characterize 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  $l_x^{(\tau)}$ ,  $q_x^{(\tau)}$ ,  ${}_t p_x^{(\tau)}$ ,  ${}_t d_x^{(\tau)}$ ,  ${}_t \mu_x^{(\tau)}$  (t).
- 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.
  - Apply assumptions about the pattern of failures between integral ages to obtain the associated (discrete) single decrement models from a discrete multiple decrement model as well as the discrete multiple decrement model that results from two or more discrete single decrement models.
12. Generalize the models of 9, 10, and 11 to multiple state models characterized in terms of transition probability functions or transition intensity functions (forces of transition).
13. Define a counting distribution (frequency distribution).
- Characterize the following distributions in terms of their parameters and moments: Poisson, mixed Poisson, negative binomial, binomial, and the (a,b,1) class of distributions.
  - 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.
14. Define a loss distribution.
- Characterize the following families of distributions in terms of their parameters and moments: transformed beta, transformed gamma, inverse transformed gamma, lognormal and inverse Gaussian.
  - 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.
15. Define a compound distribution.
  16. Calculate probabilities associated with a compound distribution when the compounding distribution is a member of the families in 13, and the compounded distribution is discrete or a discretization of a continuous distribution.
  17. Adjust the calculation of 16 for the impact of policy modifications such as deductibles, policy limits and coinsurance.
  18. Define a stochastic process and distinguish between discrete-time and continuous-time processes.
  19. Characterize 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.
  20. Define a counting process.
  21. Characterize a Poisson process in terms of:
    - The distribution of the waiting times between events;
    - The distribution of the process increments; and
    - The behavior of the process over an infinitesimal time interval.
  22. Define a nonhomogeneous Poisson process.
    - Calculate probabilities associated with numbers of events and time periods of interest.
  23. Define a compound Poisson process.
    - Calculate moments associated with the value of the process at a given time.
    - Characterize the value of the process at a given time as a compound Poisson random variable.
  24. Define a continuous-time Markov chain.
    - Characterize such a process in terms of transition intensity functions and in terms of transition probability functions.
    - Use the Chapman-Kolmogorov equations to calculate probabilities associated with the value of the process at a given time.

- Use the Kolmogorov differential equations to obtain transition probability functions from the transition intensity functions in special cases.
  - Calculate the limiting distribution of the value of the process.
25. Define a Brownian motion process.
- 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.
  - Define a Brownian motion process with drift and a geometric Brownian motion process.
26. For a discrete-time surplus process:
- Calculate the probability of ruin within a finite time by a recursion relation.
  - Analyze the probability of ultimate ruin via the adjustment coefficient and establish bounds.
27. For a continuous-time Poisson surplus process:
- Derive an expression for the probability of ruin assuming that the claim amounts are combinations of exponential random variables.
  - Calculate the probability that the surplus falls below its initial level, determine the deficit at the time this first occurs, and characterize the maximal aggregate loss as a compound geometric random variable.
  - Approximate the probability of ruin using the compound geometric recursion.
  - Analyze the probability of ruin: analytically (e.g., adjustment coefficient); numerically; and by establishing bounds.
  - Determine the characteristics of the distribution of the amount of surplus (deficit) at: first time below the initial level; and the lowest level (maximal aggregate loss).
28. Analyze the impact of reinsurance on the probability of ruin and the expected maximum aggregate loss of a surplus process.
29. Generate discrete random variables using basic simulation methods.
30. Generate continuous random variables using basic simulation methods.
31. Construct an algorithm to appropriately simulate outcomes under a wide variety of stochastic models.

## ***Applications of Actuarial Models***

The candidate is expected to be able to apply the models above to business applications. The candidate should be able to determine an appropriate model for a given business problem and be able to determine quantities that are important in making business decisions, given the values of the model parameters. 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; and
- Solvency (ruin).

Note: Concepts, principles and techniques needed for Exam 3 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. Classification of Models**

Candidates should understand the differences among the models and the methods, and recognize the underlying similarities. Candidates also should be able to explain the difference between a stochastic and a deterministic model and identify the advantages and disadvantages of each.

### **READINGS**

Background reading: Jones, B.L., "Actuarial Models and Modeling: An Interactive Approach" (CD-ROM), 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. Contingent Payment Models**

Candidates 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.

### **READINGS**

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 4, Sections 5.1-5.4, 6.1-6.4, 7.1-7.6, Chapter 8, Sections 9.1-9.8, Chapter 10.

## **C. Survival Models**

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.

In addition, candidates 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).

### **READINGS**

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.

Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag, New York, Chapters 2 and 3 (excluding 3.6).

## **D. Frequency and Severity Models**

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.

### **READINGS**

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, 2.1, 2.2 (Definitions 2.10, 2.11, 2.12, 2.13 only), 2.6 (pp. 74-77, 83 only), 2.7 (excluding Example 2.51), 2.10 (excluding 2.10.1 and following), 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), 3.6.1, 3.7 (excluding 3.7.1 and 3.7.2), 3.9 (Example 3.29 only), 3.10.1 (excluding Example 3.34 and following), 3.10.2 (excluding Example 3.38 and following).

## **E. Compound Distribution Models**

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.

### **READINGS**

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 1.4, 4.1-4.3, 4.5-4.6 (excluding 4.6.5.2), 4.8, 4.9.4 (p. 336 only).

## **F. Stochastic Process Models**

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.

### **READINGS**

Ross, S.M., *Introduction to Probability Models* (Seventh Edition), 2000, Academic Press, San Diego, Sections 2.8, 4.1-4.4, 4.5.1, 4.6, 5.3-5.4, 6.1-6.5, 6.8, 10.1-10.4.

Jones, B.L., "Stochastic Models for Continuing Care Retirement Communities," *North American Actuarial Journal*, Volume 1, Number 1, pp. 50-64. [This article may be downloaded from the Exam 3 description in the *Syllabus* section of the Students' Corner on the CAS Web Site ([www.casact.org](http://www.casact.org)).]

## G. Ruin Models

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 at the lowest level (maximal aggregate loss), and the impact of reinsurance.

### READINGS

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 13 (excluding autoregressive discrete-time model and Appendix), Section 14.5.

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 6.2.3, 6.3.1, 6.3.2.1.

**Notation:** Some notation presented in Chapters 13 and 14 of *Actuarial Mathematics* is introduced in Chapter 12. Candidates may find it helpful to refer to Chapter 12 when studying the readings in Chapters 13 and 14.

## H. Simulation of Models

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.

### READINGS

Ross, S.M., *Simulation* (Second Edition), 1997, Academic Press, San Diego, Sections 3.1, 4.1-4.3, Chapters 5 (excluding 5.3), 6.

**Note:** The following will be provided to candidates at the time of the examination: an inventory of continuous distributions, an inventory of discrete distributions, a normal table, and an illustrative life table. Copies may be downloaded from the Exam 3 description in the *Syllabus* section of the Students' Corner on the CAS Web Site ([www.casact.org](http://www.casact.org)). A copy also will be included in the Introductory Study Notes (see page 35).

## Index to Text References for Exam 3

The following information is furnished for those who wish to purchase the text references cited for Exam 3.

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.actexamdriver.com](http://www.actexamdriver.com); e-mail: [retail@actexamdriver.com](mailto:retail@actexamdriver.com).

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: [www.actuarialbookstore.com](http://www.actuarialbookstore.com).

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 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: [www.soa.org](http://www.soa.org).

Jones, B.L., "Stochastic Models for Continuing Care Retirement Communities," *North American Actuarial Journal*, Volume 1, Number 1, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: [www.soa.org](http://www.soa.org).

Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag New York, Inc., P.O. Box 2485, Secaucus, NJ 07096-2485; telephone: (800) 777-4643; fax: (201) 348-4505.

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@actexamdriver.com](mailto:retail@actexamdriver.com).

Ross, S.M., *Introduction to Probability Models* (Seventh Edition), 2000, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.

Ross, S.M., *Simulation* (Second Edition), 1997, 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](http://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 35.

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 will be introduced to a variety of tools for the calibration and evaluation of the models on Exam 3.

Four textbooks are recommended for this examination. The texts are: *Survival Analysis* by J.P. Klein and M.L. Moeschberger (1997); *Loss Models: From Data to Decisions* by S.A. Klugman, H.H. Panjer, and G.E. Willmot (1998); *Econometric Models and Economic Forecasts* by R.S. Pindyck and D.L. Rubinfeld (1998); and *Simulation* by S.M. Ross (1997).

### 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:

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/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 have the same structure. 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, 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. Perform statistical tests to determine the presence of measurement error or specification error.
18. Develop deterministic forecasts from time series data, using simple extrapolation and moving average models, applying smoothing techniques and seasonal adjustment when appropriate.

19. Use the concept of the autocorrelation function of a stochastic process to test the process for stationarity.
20. Generate a forecast using the general ARIMA model and develop confidence intervals for the forecast.
21. Test the hypothesis that a given stochastic process is a random walk.
22. For an ARIMA process (including simpler models as special cases), estimate the model parameters, and perform appropriate diagnostic checks of the model.
23. Apply limited fluctuation (classical) credibility including criteria for both full and partial credibility.
24. Perform Bayesian analysis using discrete and continuous examples.
25. Apply the Buhlmann-Straub credibility model to basic situations. Understand the relationship to the Bayesian model.
26. Apply the conjugate prior in Bayesian analysis and Buhlmann-Straub credibility, and, in particular, to the Poisson-gamma model.
27. Apply empirical Bayesian methods in the nonparametric and semiparametric cases.
28. Compare and contrast the assumptions underlying limited fluctuation credibility, Bayesian analysis, and the Buhlmann-Straub credibility model.
29. Determine an appropriate number of simulations to perform in order to estimate a quantity of interest.
30. Quantify the variability of an estimate in the context of simulation.
31. Determine the bootstrap estimates of the mean squared error of an estimator.
32. 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.; and
- 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), 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**

**NEW** Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag, New York, Chapters 4, 5 (excluding 5.2), 6 (excluding 6.4), Sections 7.1-7.3, and Chapter 8.

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



York, Sections 2.2-2.6, 2.8-2.10, 3.2.3, 3.3.3-3.3.4, 3.4.2, 3.5, 3.10.1 (beginning with Example 3.34).

### **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 3-7, 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.

#### **READINGS**

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, 5.1-5.5 (excluding 5.4.6 and 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* (Second Edition), 1997, Academic Press, San Diego, Chapters 7 and 9.

**Note:** The following will be provided to candidates at the time of the exam: an inventory of continuous distributions, an inventory of discrete distributions, and normal, chi-square, t, and F tables. Copies may be downloaded from the Exam 4 description in the *Syllabus* section of the Students' Corner on the CAS Web Site ([www.casact.org](http://www.casact.org)). A copy also will be included in the Introductory Study Notes (see page 35).

## Index to Text References for Exam 4

The following information is furnished for those who wish to purchase the text references cited for Exam 4.

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.actexamdriver.com](http://www.actexamdriver.com); e-mail: [retail@actexamdriver.com](mailto:retail@actexamdriver.com).

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: [www.actuarialbookstore.com](http://www.actuarialbookstore.com).

Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag New York, Inc., P.O. Box 2485, Secaucus, NJ 07096-2485; telephone: (800) 777-4643; fax: (201) 348-4505.

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@actexamdriver.com](mailto:retail@actexamdriver.com).

Pindyck, R.S.; and Rubinfeld, D.L., *Econometric Models and Economic Forecasts* (Fourth Edition), 1998, Irwin McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Ross, S.M., *Simulation* (Second Edition), 1997, 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](http://www.sliderulebooks.com).

## Exam 5

# Introduction to Property and Casualty Insurance and Ratemaking

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to “Materials for Study” on page 41 of this *Syllabus*. Items marked with a bold **SK** or **SKU** constitute the 2001 CAS Exam 5 Study Kit that is available from the CAS Office for a cost of \$28 (\$46 Canadian). Items marked with a bold **W** are available in the Syllabus section of the Students’ Corner on the CAS Web Site ([www.casact.org](http://www.casact.org)). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2001 CAS Exam 5 Web Notes—from the CAS Office for a cost of \$46 (\$72 Canadian). The 2001 Update to the 2000 Study Kit is available at a cost of \$5 (\$11 Canadian) and includes only the items marked with a bold **SKU**. Information about Study Kits and Web Notes is available on page 35.

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

The insurance policy is a contract describing the services and protection that an insurer provides to an insured. It is, in effect, the only “product” the insurance buyer receives until a loss occurs. Because actuaries will be pricing this “product,” it is essential that they have an understanding of what the product includes. Also, as the contract is amended, either by choice or by legislative or judicial activity, an actuary will be called on to evaluate the effect these changes will have on the cost of providing the coverage. Therefore, in studying the policy forms, the candidate should develop an understanding of the nature of the coverages provided and the exposure bases used in the respective lines of insurance.

Candidates should develop skills in reading and interpreting the policies they will be pricing or for which they will be developing reserves. The policies in these readings should be viewed as representative 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. The manual excerpts should be studied as illustrative of the part that manuals play in the forms, coverages, and rating process.

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The other major topic covered in this section of the exam is insurance company operations. This is broken down into several key areas including company organization, marketing and distributions systems, underwriting, and claims.

Actuaries get involved in many aspects of marketing including product design and modification, as it relates to pricing and market research. Candidates should be well versed in the responsibilities of the marketing function, as well as the basic differences among distribution systems for insurance products.

Underwriting is a key function of the insurance business, and it is critical to the success of the insurance endeavor. Actuaries work closely with underwriters to ensure that the prices reflect the goals of the underwriting process. As a result, candidates should have a thorough understanding of the underwriting function including purpose, principles, and activities.

The claims settlement process determines the value of losses that the actuary uses for both ratemaking and reserving. Candidates should know how claims are settled in terms of relevant policy provisions and the impact on overall loss levels.

Much of the material in this section is from the readings for the CPCU examinations. For more information about CPCU examinations, contact the American Institute for Chartered Property and Casualty Underwriters at (800) 644-2101.

## READINGS

- SK** 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.
- L** Hamilton, K.L.; and Malecki, D.S., *Personal Insurance: Property and Liability* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1999, pp. 17-41, 45-66, 75-96, 205-250, 267-295.
- SK** 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.

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- 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.
- SK** 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.
- SK** Hallman, G.V.; and Hamilton, K.L., *Personal Insurance: Life, Health, and Retirement* (First Edition), 1994, American Institute for Chartered Property Casualty Underwriters, pp. 1-22.
- SK** Health Insurance Association of America, *Group Life and Health Insurance—Part C* (Third Edition), 1992, Chapter 2, pp. 11-33.
- L** Webb, B.L.; Harrison, C.M.; and Markham, J.J., *Insurance Operations* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1997, Volume 1, pp. 1-19, 39-62, 81-170.
- SK** Webb, B.L.; Harrison, C.M.; and Markham, J.J., *Insurance Operations* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1997, Volume 2, pp. 109-111 (up to Summary), 199-246.
- SKU** Insurance Services Office, Inc., Personal Automobile Policy (Edition 6-98).
- NEW**
- SKU** Insurance Services Office, Inc., Personal Automobile Manual (Effective 6-98), General Rules 1-6.
- NEW**

## B. Ratemaking

This section contains readings that describe ratemaking concepts in broad, general principles, as well as in specific detail. Certain general subjects of particular importance, such as credibility theory, classification, individual risk ratemaking, trend, loss development, and increased limits ratemaking among others, are addressed in separate papers. Issues specific to individual lines are also presented as illustrations of the applications of general principles.

Candidates should have a thorough understanding of the basic principles of ratemaking, such that they can analyze data, select an appropriate

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technique, and develop a solution to a numerical problem. In addition, candidates should be familiar with the more specific ratemaking techniques presented in the readings, and should be able to compare the relative advantages and disadvantages. Candidates should be able to discuss why certain procedures are applicable to individual lines of business and specific situations, as well as work problems using those techniques.

Candidates should be prepared to discuss the impact of changes in the economic environment on the pricing of insurance.

Candidates are not responsible for current, specific developments in ratemaking procedures outside of the readings in this section.

The following list of topics is typical, although not necessarily all inclusive, of those that candidates should be prepared to discuss:

- The selection and evaluation of ratemaking techniques corresponding to the characteristics of a given line of business.
  1. Pure premium compared to loss ratio method.
  2. Calendar year compared to accident year vs. policy year.
  3. Credibility and its complement.
  4. Territorial and risk classification relativities.
  5. Underwriting expense and profit considerations.
  6. Special adjustments to losses.
- Methods for trending and projecting losses and premiums.
  1. Internal compared to external indices.
  2. Relation to loss development.
  3. Claim cost projection compared to current cost index approach.
  4. Impact of deductibles, coinsurance, and insurance-to-value programs.
- Other special topics covered by the readings may be tested, including the application of ratemaking principles to problems that may not have generally recognized solutions.

Finally, this section includes readings that cover the planning and use of internal statistical information, and the compilation and presentation of insurance statistics for statistical reporting and ratemaking purposes. Candidates should be familiar with the kinds of data captured in the data collection plans discussed. They should also be able to compare the

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different plans, and note the links to the various ratemaking techniques.

## READINGS

- L** McClenahan, C.L., "Ratemaking," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 2, pp. 25-90.
- L** Finger, R.J., "Risk Classification," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 5, pp. 233-281.
- W** Committee on Ratemaking Principles, *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, Casualty Actuarial Society.
- W** Bouska, A.S., "Exposure Bases Revisited," CAS Study Note.
- W** Boor, J.A., "The Complement of Credibility," *Casualty Actuarial Society Forum*, Fall 1995, pp. 323-354. Examination questions will not be based directly on Appendices A, B, and C, which were included in this study note for completeness.
- SK** Study Kit Reading: Head, G.L., *Insurance to Value*, Chapters 1, 2, 6, and 7, and Appendices 1-4. (Reproduced with permission of the Huebner Foundation.)
- W** Kelley, R., "Homeowners Insurance to Value—An Update," *Casualty Actuarial Society Forum* including the Ratemaking Call Papers, 1994, pp. 529-562.
- SK** 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.
- 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).
- 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.

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- 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).
- W** McCarthy, T.L., "Premium Trend Revisited," *Casualty Actuarial Society Forum*, Winter 2000, pp. 47-78.
- NEW**
- W** Lange, J.T., "The Interpretation of Liability Increased Limits Statistics," *PCAS LVI*, 1969, pp. 163-173.
- W** Brown, B.Z.; and Schmitz, M.C., "Study Note Reading on Deductibles," CAS Study Note, 1998.
- W** 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.
- L** Tiller, M.W., "Individual Risk Rating," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 3, pp. 91-141.
- W** Tiller, M.W., "Individual Risk Rating," CAS Study Note.
- W** Schofield, D., "Going From a Pure Premium to a Rate," CAS Study Note, 1998.
- W** Boor, J., "A Macroeconomic View of the Insurance Marketplace," CAS Study Note, 1998.
- W** Boor, J., "The Impact of the Insurance Economic Cycle on Insurance Pricing," CAS Study Note, 1998.
- W** "Group Medical/Dental Benefit Pricing," CAS Study Note, pp. 1-23. Candidates are only responsible for the cited pages although the complete study note is included in the Study Kit.
- W** Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice No. 13, Trending Procedures in Property/Casualty Insurance Ratemaking."
- W** Prevosto, V.R., "Study Note: ISO Statistical Plans," CAS Study Note.

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- 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.

## Index to Text References for Exam 5

The following information is furnished for those who wish to purchase the text references cited for Exam 5.

Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, 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* (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](mailto:office@casact.org); Web site: [www.casact.org](http://www.casact.org).

Head, G.L., *Insurance to Value*, Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, IL 60430.

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](http://www.hiaa.org).

Insurance Services Office, 7 World Trade Center, New York, NY 10048; telephone: (800) 888-4476.

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## Exam 6

# Reserving, Insurance Accounting Principles, and Reinsurance

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to “Materials for Study” on page 41 of this *Syllabus*. Items marked with a bold **SK** constitute the 2001 CAS Exam 6 Study Kit that is available from the CAS Office for a cost of \$18 (\$31 Canadian). Items marked with a bold **W** are available in the Syllabus section of the Students’ Corner on the CAS Web Site ([www.casact.org](http://www.casact.org)). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2001 CAS Exam 6 Web Notes—from the CAS Office for a cost of \$49 (\$77 Canadian). Information about Study Kits and Web Notes is available on page 35.

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. Reserving Techniques

An actuary may be expected to establish and review actuarial reserves, whether these are established by an insurance entity or by a non-insurance entity that is retaining risk. Candidates should be prepared to discuss such topics as:

1. The selection and evaluation of a loss reserving method appropriate to a given line of insurance:
  - a. For known claims;
  - b. For IBNR claims; and
  - c. For all incurred claims.
2. Testing of adequacy of previous loss and loss expense reserve levels.
3. Evaluating the adequacy of current loss expense reserve levels.
4. The identification of, and correction for, effects on loss reserves stemming from:
  - a. Changes in the loss climate;
  - b. Changes in a company’s handling of claims; and
  - c. Data problems.

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5. Special reserving situations in a line arising from:
  - a. Catastrophe losses;
  - b. Reopened claims;
  - c. Policies on a claims-made rather than occurrence basis;
  - d. Excess loss reserves; and
  - e. Discounting loss reserves.
6. The unearned premium reserve:
  - a. Improving its accuracy;
  - b. The reserve for retrospective returns;
  - c. Policies on a claims-made basis; and
  - d. Deposit premium policies.
7. Allocated loss expense reserves.
8. Unallocated loss expense reserves.
9. Statutory Annual Statement reserves.

### READINGS

- L** Wisner, R.F., "Loss Reserving," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 4, pp. 143-232.
- W** Brosius, E., "Loss Development Using Credibility," March 1993.
- W** 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; Author's response, *PCAS, LXI*, 1974, pp. 84-85.
- W** 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; White, H.G., *PCAS LX* 1973, pp. 165-168.
- W** Bouska, A.S.; and McIntyre, T.S., "Measurement of U.S. Pollution Liabilities," *Casualty Actuarial Society Forum*, Summer 1994 Edition, pp. 73-160. Candidates will not be held responsible for material in appendices E through H.

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- 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.
- W** Fisher, W.H.; and Lester, E.P., "Loss Reserve Testing in a Changing Environment," *PCAS LXII*, 1975, pp. 154-171.
- W** McClenahan, C.L., "A Mathematical Model for Loss Reserve Analysis," *PCAS LXII*, 1975, pp. 134-145. Including discussion of paper: Skurnick D., *PCAS LXIII*, 1976, pp. 125-127. Candidates will not be held responsible for notation or the development of the formulae in this paper.
- 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.
- W** Khury, C.K., "Loss Reserves: Performance Standards," *PCAS LXVII*, 1980, pp. 1-21. (Candidates will not be responsible for notation or development of the formulae in this paper.) Including discussion of paper: Berquist, J.R., *PCAS LXVII*, 1980, pp. 22-23.
- 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.
- 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.
- W** Siewert, J.J., "A Model for Reserving Workers Compensation High Deductibles," *Casualty Actuarial Society Forum*, Summer 1996, pp. 217-244.
- 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.

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- W** 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.
- NEW**
- SK** Linqunti, A.J., “Calculation of Unearned Premium Reserves on Interim Audited Risks—Monthly, Quarterly, and Semi-Annual Basis.”
- W** Hayne, R.H., “Unearned Premium Reserves—Change is in the Wind,” *Casualty Actuarial Society Forum*, Fall 1999, pp. 177-205.
- NEW**
- 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.
- W** 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.
- 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.

## **B. Statement of Principles and Standards of Practice**

Candidates should be familiar with the professional principles and standards of practice applicable to estimating and establishing loss and loss adjustment expense reserves.

### **READINGS**

- W** Casualty Actuarial Society, *Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves*, May 1988.

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- W** 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.

### **C. Dynamic Financial Analysis**

Candidates should have a conceptual knowledge of Dynamic Financial Analysis models and their application in evaluating balance sheet adequacy.

#### **READINGS**

- W** Warthen, T.V., III; Sommer, D.B., "Dynamic Financial Modeling—Issues and Approaches," *Casualty Actuarial Society Forum*, Spring 1996, pp. 291-328.

### **D. Insurance Accounting, Expense Analysis, and Published Financial Information**

Candidates should obtain a general knowledge of insurance accounting, including its terminology and practice. Candidates should understand the details of, and reasons for, the differences between the accounting methods employed under statutory and Generally Accepted Accounting Principles (GAAP) accounting. Candidates should understand the differences between statistics included in these reports and those used for ratemaking and the various types of experience analysis. In addition, candidates should be able to interpret and evaluate data from the reports, identify potential distortions in the data, and suggest possible means of adjusting for any distortions.

#### **READINGS**

- L** Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapters 4, 6, 7, 11, and Appendix F (Glossary of Accounting Terms).
- SK** Marshall, D.H.; McManus, W.W.; Kazenski, P.M.; and Scoles, K.N., Jr., *Accounting and Finance for Insurance Professionals* (First Edition), American Institute for Chartered Property Casualty Underwriters, 1997, Chapter 5, Chapter 11 (pp. 327 - 331, 350-358, 364-367). NOTE: Although other portions of the text will not specifically be tested, candidates may find this text

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to be useful as basic accounting background.

- SK** Troxel, T.E.; and Bouchie, G.E., *Property-Liability Insurance Accounting and Finance* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1995, Chapter 2, Chapter 3 (pp. 126 - 131).
- W** 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.
- SK** Financial Accounting Standards Board, "Statement of Financial Accounting Standards No. 5—Accounting for Contingencies," Paragraphs 1-4, 8-11, 15, 40-45.
- 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.
- L** D'Arcy, S.P., "Special Issues—Data Sources," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 9, pp. 567-573.

## **E. Reinsurance**

A key component of the insurance process is the sharing of risk between an insurer and a reinsurer. In this section, candidates should develop a thorough understanding of the types of reinsurance, the purposes of reinsurance, and how it is marketed and underwritten. Candidates should appreciate the unique characteristics of reinsurance, and how actuarial concepts such as pricing and reserving are adapted to apply to reinsurance.

Candidates should also understand the financial reporting issues and concepts that apply to reinsurance transactions.

### **READINGS**

- L** Elliott, M.W.; Webb, B.L.; Anderson, H.N.; and Kensicki, P.R., *Principles of Reinsurance*, Insurance Institute of America, 1995, Volume 1, Chapter 1, 2 (pp. 47-60), 3 (pp. 78-82), and 6.
- SK** Elliott, M.W.; Webb, B.L.; Anderson, H.N.; and Kensicki, P.R., *Principles of Reinsurance*, Insurance Institute of America, 1995, Volume 2, pp. 107-113.

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- L** 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.
- W** Clark, D.R., "Basics of Reinsurance Pricing," CAS Study Note, 1996.
- W** 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.
- L** Patrik, G.S., "Reinsurance," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 6, pp. 344-374 (section on Reinsurance Loss Reserving).
- SK** National Association of Insurance Commissioners, "Reinsurance," *Accounting Practices and Procedures Manual for Property/Casualty Companies*, 1994, Chapter 22.
- 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.
- W** Steeneck, L., "Commutation of Claims," CAS Study Note, 1998.

## Index to Text References for Exam 6

The following information is furnished for those who wish to purchase the text references cited for Exam 6.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878;  
 telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: [www.actuarialbookstore.com](http://www.actuarialbookstore.com).

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Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, 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* (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](mailto:office@casact.org); Web site: [www.casact.org](http://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](http://www.iasa.org).

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

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](mailto:retail@actexmadriver.com).

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

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](http://www.sliderulebooks.com).

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## Exam 7-Canada

### Nation-Specific Examination: Annual Statement, Taxation, and Regulation

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to “Materials for Study” on page 41 of this *Syllabus*. Items marked with a bold **SK** or **SKU** constitute the 2001 CAS Exam 7-Canada Study Kit that is available from the CAS Office for a cost of \$99 (\$151 Canadian). Items marked with a bold **W** are available in the *Syllabus* section of the Students’ Corner on the CAS Web Site ([www.casact.org](http://www.casact.org)). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2001 CAS Exam 7-Canada Web Notes—from the CAS Office for a cost of \$17 (\$29 Canadian). The 2001 Update to the 2000 Study Kit is available at a cost of \$8 (\$16 Canadian) and includes only the items marked with a bold **SKU**. Information about Study Kits and Web Notes is available on page 35.

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 federal and provincial insurance programs. Finally, Section D covers finance and solvency issues. It includes insurance accounting and its relevant laws and regulations. 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

The legal foundation of tort law is a subject which is not strictly actuarial in nature, but which 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. Candidates are also presented with material regarding recent changes and trends in American tort law. The Canadian and American material should provide background and a basic understanding of how tort law gives rise to the need for insurance.

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## READINGS

- L** Linden, A.M., *Canadian Tort Law* (Sixth Edition) Student Edition (paperback), Butterworths, 1997, pp. 1-32, 97-112, 115-123, 125-146, 155-159, 227-231, 235-242, 271-279, 284-285, 298-301, 325-329, 345-346, 370-372, 453-455, 459-468, 476-481, 486-488, 494-497, 499-503, 511-522, 557-566, 570-584, 588-602, 610-623, 630-650. Candidates will be held responsible for the following cases: *Byrne v. Boadle* (Chapter 8); *Rylands v. Fletcher* (Chapter 14); *Donaghue v. Stevenson* (Chapter 16); and *Just v. British Columbia* (Chapter 17).
- SK** 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.
- SK** State of New York Advisory Commission on Liability Insurance, "Reform of the Tort Law," *Insuring Our Future*, Part Two, Section II, pp. 121-163.
- SK** Hensler D.R.; Vaiana, M.E.; Kakalik, J.S.; and Peterson, M.A., *Trends in Tort Litigation, The Story Behind the Statistics*, Rand Institute for Civil Justice, 1987.

## B. Regulation of Insurance

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 also impact insurance regulation to the extent they interpret the law and thereby modify regulatory behavior. Thus, candidates are presented with a number of Canadian cases that have contributed to the development of legal precedents.

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

## READINGS

- 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. Candidates will be held 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); and Regal Films Corporation Ltd. v. Glens Falls Insurance Company (Chapter 2).
- SK** McDonald, B.R., *Life Insurance Laws of Canada (Common Law Provinces)*, Life Underwriters Association of Canada, 1995, pp. A1-1, A2-1 to A2-11, 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.
- L** 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.
- SK** Baer, M.G.; and Rendall, J.A., *Cases on the Canadian Law of Insurance* (Fifth Edition), Carswell, 1995, pp. 277-279, 423-426, 507-519, 742-748 and 750-752. Candidates will be held responsible for the following cases: Berkowitz v. MPIC (Chapter 7); Fletcher v. MPIC (Chapter 8); Broadhurst & Ball v. American Home and Dillon v. Guardian Insurance (Chapter 11).
- SK** Zurich Insurance Company vs. Ontario Human Rights Code (C.D.P.), [1992] 2 R.C.S., pp. 321-328.
- L** 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*.

## C. Government Plans

Government plans are an intrinsic part of the overall insurance system. The actuary should have a general understanding of Canadian federal and provincial plans.

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This section begins with coverages provided by federal government insurance 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 environmental liabilities in the United States (Superfund) and on Canadian earthquake guidelines.

The second part of this section addresses provincial insurance plans. Candidates are responsible for a general understanding of Canadian provincial health plans. An understanding of the regulatory environment surrounding U.S. workers' compensation 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.

## **READINGS**

### **1. Federal Plans**

#### **a. Introduction to Government Insurance**

**SK** Greene, M., "Government Insurers," *Issues in Insurance* (Fourth Edition), American Institute for Property and Liability Underwriters, 1987, Volume I, Sections I and VI.

#### **b. Employment Insurance**

**L** Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, Chapter 14, "Employment Insurance."

#### **c. Government Pension Programs**

**L** Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, Chapter 3, "Government Pension Programs."

**SK** Hallman, G.V.; and Hamilton, K.L., *Personal Insurance: Life, Health & Retirement* (First Edition), American Institute for Chartered Property Casualty Underwriters, 1994, pp. 66-74.

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- SK** Canadian Institute of Actuaries, *Report of the Task Force on the Future of the Canada/Quebec Pension Plans*, May 1996, excluding Appendices.

**d. Natural Disasters**

- W** Insurance Services Office, Inc., *Superfund and the Insurance Issues Surrounding Abandoned Hazardous Waste Sites*, Insurance Services Office, Inc., 1995, Executive Summary, Sections 1, 4, and 5. Candidates will not be tested on material that appears in the tables or figures.
- SK** Office of the Superintendent of Financial Institutions, “Earthquake Exposure Sound Practices Guideline,” 1997, including Appendices 1 and 2. Candidates are not responsible for the tables in Appendix 2.

**2. Provincial Plans**

**a. Provincial Health Plans**

- L** Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, Chapter 12, “Provincial Hospital and Medical Insurance Plans,” and Chapter 15, “Hospital, Medical, Drug, Dental and Vision Care Plans.”
- SK** Canadian Institute of Actuaries, *Task Force on Health Care Financing*, February 1996. Candidates are not responsible for material in tables or figures.

**b. Workers’ Compensation**

- L** Chamber of Commerce of the United States, *Analysis of Workers’ Compensation Laws*, 1999. Candidates will not be responsible for material contained in the tables.
- L** Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, Chapter 13, “Workers’ Compensation.”
- SK** Insurance Bureau of Canada Position Paper, “Private Delivery of Workers’ Compensation Insurance in Canada,” January 1998.

**c. Auto—No-Fault and Tort, Public and Private Systems**

- SK** Ontario Insurance Commission, *Section 411/412 Filing*

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*Guidelines for Proposed Revisions to Automobile Insurance Rates and Risk Classification Systems*, November 1996, Part A, Part B, Part C (Sections 3 - 8 and 10), Appendices B and C.

- 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; and Section VI.
- SK** KPMG, Eckler Partners Ltd. & Exactor Insurance Services, Inc.,  
**NEW** “Motor Vehicle Insurance in British Columbia—At the Crossroads, Volume II: Options and Choices,” Section II.

**d. Residual Markets**

- SK** Hamilton, K.L.; and Malecki, D.S., *Personal Insurance: Property & Liability* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1999, pp. 191-202, 307-312.
- SK** Groupement des assureurs automobiles, *Risk Sharing Plan—Procedures Manual; General Description of the Plan*, 1996, Sections 15A to 15E and 15G.
- SK** Groupement des assureurs automobiles, *Risk Sharing Plan—Procedures Manual; By-Law No.7 - Risk Sharing Plan*, 1996,  
**NEW** 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, 9.1 to 9.6.
- SK** Facility Association, *Plan of Operation*, March 1995, pp. 1-5, 23 (candidates will not be responsible for the chart shown on p. 24), 30-32, 34-40.
- SK** Ghezzi, T.L., “Actuarial Perspective on Property/Casualty Redlining Issues,” *Actuarial Digest*, February/March 1996.

**e. Guaranty Funds**

- SK** “Compensation Plan for Property and Casualty Insurers,” May 1997.

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## D. Finance and Solvency

This section covers finance, taxation, and solvency tests. The intent is to address Canadian and global issues. The lack of Canadian literature on certain subjects led to the use of US 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 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, Risk-Based Capital Requirements and the Dynamic Capital Adequacy Testing of the Canadian Institute of Actuaries.

### READINGS

#### 1. Financial Reporting

##### a. Insurance Accounting

- L**      *Official NAIC Annual Statement Blanks, Property and Casualty, 2000* (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.
- NEW**
- L**      Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapters 2, 5, 9, 10, and 13.
- W**      Feldblum, S., "Direct Charges and Credits to Surplus," CAS Study Note, April 1999.
- SK**      KPMG Peat Marwick Thorne, *The Property & Casualty Insurance Industry in Canada*, 1992, excluding Appendix A.

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- L** 2000 Uniform Annual Return approved by the Canadian  
**NEW** Council of Insurance Regulators—P&C-1, pp. 10.40-10.42, 10.60, 20.10-20.51, 40.10, 40.90, 60.xx, 65.xx, 67.xx, 70.10-70.35, 80.xx, and 99.10.
- L** Canadian Council of Insurance Regulators, *Annual Statement*  
**NEW** *Instructions P&C-1*, Sections I, III, IV, V and VI, excluding instructions for Annual Return pp. 30.10, 30.11, 30.40, and 30.50.
- L** Insurance Accounting and Systems Association, *Property-*  
**NEW** *Casualty Insurance Accounting* (Seventh Edition), 1998, Chapter 17, excluding pp. 17-20 and 17-21.
- W** Feldblum, S., “Selected Exhibits from the Canadian Annual  
**NEW** Statement,” CAS Study Note, February 1996, excluding pp. 12 to 18.
- SKU** Canadian Council of Insurance Regulators, *Explanatory Notes*  
**NEW** *for the Minimum Capital Test (MCT)*, pp. 1- 6, February 2000.
- SKU** Canadian Council of Insurance Regulators, *Guideline—*  
**NEW** *Minimum Capital Test (MCT) for Property and Casualty Insurers*; pp. 1-9, 12-13, 19-22, 24 and attachment, February 2000.

#### **b. Expense Reporting**

- L** 2000 Insurance Expense Exhibit.  
**NEW**
- W** Feldblum S., “The Insurance Expense Exhibit and the  
Allocation of Investment Income” (Fifth Edition), CAS Study Note, May 1997.
- L** Insurance Information Centre of Canada, Direct Expense Report, Instructions, Forms and Results, Parts I; and II, Sections A, D, E, and K.

#### **c. Discussions on Financial Reporting**

- 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.

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- SKU** Office of the Superintendent of Financial Institutions Canada, "Guideline D-5 on Accounting for Structured Settlements."
- NEW**
- SK** Insurance Bureau of Canada, "Discounting of Loss Reserves in the Property and Casualty Insurance Industry Phase II," March 1, 1993, Section 1-4, 7, and 8.
- SK** Office of the Superintendent of Financial Institutions Canada, "Accounting for Property Casualty Actuarial Liabilities," September 4, 1997.
- SK** PricewaterhouseCoopers, "Financial Reporting for the Property & Casualty Insurance Industry," 1999.
- 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.
- SK** Office of the Superintendent of Financial Institutions Canada, "Annual Disclosure Requirements (Property and Casualty Insurance Enterprises)," December 1997.
- W** 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.
- SK** PricewaterhouseCoopers, "Canadian Tax Guide for Property and Casualty Insurance Enterprises," 1999.

#### **d. Federal Insurance Laws and Regulations**

- 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, 666(1), 666(2), 667(1), 667(2) and 674 (assented to December 13, 1991).
- SK** Canadian Insurance Accountants Association, Professional Development Committee, Research and Legislation Committee Information Circular HR-17, *The Insurance Companies Act Reports and Filings*, Alison R. Manzer, Cassels Brock & Blackwell.

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- W** Potvin, R., “Reinsurance (Canadian Companies) Regulations and Reinsurance (Foreign Companies) Regulations,” CAS Study Note, 1995.
- SKU  
NEW** Office of the Superintendent of Financial Institutions Canada, “1999 Instructions for the Actuary’s Report on Property and Casualty Insurance Business.”

**e. Provincial Insurance Laws and Regulations**

- SK** Inspecteur General des Institutions Financieres, “Insurers with charters from outside Quebec,” December 19, 1997.

**2. Solvency**

- SKU  
NEW** A.M. Best Canada Ltd. (formerly T.R.A.C. Insurance Services Ltd.), *Best’s Key Rating & Statistical Guide, Property & Casualty*, Parts 1 & 2. Candidates are not expected to memorize details of published insurance statistics.
- SK** 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. Candidates will not be tested on the actual calculation of the IRIS ratios.
- W** Doherty, S., “Sources of Financial Information of Canadian P&C Companies,” CAS Study Note, 1995.
- SK** Canadian Institute of Actuaries, “Dynamic Capital Adequacy Testing,” December 1998.
- SK** Canadian Institute of Actuaries, “Educational Note: Dynamic Capital Adequacy Testing—Life, Property and Casualty,” June 1999.
- W** Feldblum, S., “NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements” (excluding Section 11 and related exhibits), *PCAS LXXXIII*, 1996, pp. 297-389.

**Index to Text References for Exam 7-Canada**

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A.M. Best Canada Ltd., Suite 600, 133 Richmond Street West, Toronto, Ontario M5H 2I3, Canada; telephone: (416) 363-8266; Web site: [www.trac.com](http://www.trac.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](http://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](http://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](http://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](mailto:office@casact.org); Web site: [www.casact.org](http://www.casact.org).

Chamber of Commerce of the United States, 1615 H Street, N.W., Washington, DC 20062; telephone: (202) 659-6000 or (800) 638-6582.

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

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47, The Federal Publication, 388 King Street West, Toronto, Ontario M5V 1K2, Canada, telephone (416) 860-1611.

Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, 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](http://www.ca.cch.com).

L'inspecteur general des institutions financieres, 800, place D'Youville – 8 etage, Quebec, PQ G1R 4Y5, Canada; Web site: [www.igif.gouv.qc.ca](http://www.igif.gouv.qc.ca).

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](http://www.iasa.org).

Insurance Expense Exhibit, John S. Swift Co., Route 46, Teterboro, NJ 07608; telephone: (201) 288-2050.

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

Insurance Service Office, 7 World Trade Center, New York, NY 10048; telephone: (800) 888-4476.

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](http://www.carswell.com).

Linden, A.M., *Canadian Tort Law* (Sixth Edition), 1997, 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](http://www.butterworths.ca).

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

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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](http://www.osfi-bsif.gc.ca).

Ontario Insurance Commission, 5160 Yonge Street, PO Box 85,  
North York, Ontario M2N 6L9, Canada; telephone: (416) 250-  
7250; fax: (416) 590-7070; Web site: [www.ontarioinsurance  
.com](http://www.ontarioinsurance.com).

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## Exam 7-United States

### Nation-Specific Examination: Annual Statement, Taxation, and Regulation

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to “Materials for Study” on page 41 of this *Syllabus*. Items marked with a bold **SK** or **SKU** constitute the 2001 CAS Exam 7-US Study Kit that is available from the CAS Office for a cost of \$41 (\$65 Canadian). Items marked with a bold **W** are available in the Syllabus section of the Students’ Corner on the CAS Web Site ([www.casact.org](http://www.casact.org)). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2001 CAS Exam 7-US Web Notes—from the CAS Office for a cost of \$27 (\$44 Canadian). The 2001 Update to the 2000 Study Kit is available at a cost of \$5 (\$11 Canadian) and includes only the items marked with a bold **SKU**. Information about Study Kits and Web Notes is available on page 35.

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 the aspects of insurance regulation and laws, markets, coverages and private and governmental programs as they impact property/casualty coverages, ratemaking, and pricing in the United States. Section B covers the aspects of statutory and GAAP insurance accounting and taxation as these impact reserving and statutory reporting in the United States.

#### A. Insurance Law and Regulation

Section A of this examination covers the aspects of insurance regulation and laws, markets, coverages, private and governmental programs as they impact property/casualty coverages, ratemaking, and pricing in the US.

Section 1 covers US tort law. While not a strictly actuarial subject, these affect 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.

Sections 2 and 3 cover US statutory insurance and governmental programs. Candidates should gain a detailed knowledge of the US Social Security and Medicare systems. In addition, candidates should gain a working knowledge of the regulations concerning insurance for catastrophe events affecting the United States. In the statutory automobile insurance area,

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candidates should understand US automobile insurance programs along with no-fault concepts, financial responsibility concepts, and residual market requirements. Finally, an understanding of the regulatory environment surrounding the US Workers Compensation system is required.

Section 4 covers an introduction to regulation including the objectives of regulation. Candidates should understand the regulation of insurers as they provide an essential public service. In addition, an understanding of the dual US 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 anti-trust law as it pertains to insurance regulation.

Section 5 covers regulation as it affects insurance ratemaking in the United States. 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. Section 6 extends the topic to the regulation and governmental actions to enhance the availability of insurance.

Section 7 covers the regulation for solvency in the United States, 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.

## READINGS

### 1. Background Law and Insurance

- L** 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.
- 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.
- SK** Hensler, D.R.; Vaiana, M.E.; Kakalik, J.S.; and Peterson, M.A., *Trends in Tort Litigation. The Story Behind the Statistics*, Rand Institute for Civil Justice, 1987.

### 2. Statutory Insurance—Automobile Insurance

- SK** O'Connell, J.; and Joost, R.H., "Giving Motorists a Choice

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Between Fault and No-Fault Insurance,” *Virginia Law Review*, February 1986.

### 3. Government Programs

- SK** Hallman, G.V.; and Hamilton, K.L., *Personal Insurance: Life, Health and Retirement* (First Edition), American Institute for Chartered Property Casualty Underwriters, 1994, pp. 66-74.
- SK** Rejda, G.E., “Financing the Social Security Program,” *Social Insurance & Economic Security* (Sixth Edition), Prentice Hall, 1999, Chapter 7 (pp. 148-166).
- SK** Greene, M. “Government Insurers,” *Issues in Insurance* (Fourth Edition), American Institute for Property and Liability Underwriters, 1987, Volume I (excluding the final two chapters).
- 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.
- SKU  
NEW** Barlett, 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.

### 4. Introduction to Regulation

- L** Brady, J.L.; Mellinger, J.H.; and Scoles, K.N., *The Regulation of Insurance* (First Edition), Insurance Institute of America, 1995, Chapters 2 (including Exhibit 2-1), 3, 4 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*.

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- L** Brady, J.L.; Mellinger, J.H.; and Scoles, K.N., *The Regulation of Insurance* (First Edition), Insurance Institute of America, 1995, Chapter 5 (excluding “Other Federal Regulation Affecting the Insurance Industry,” pp. 148-154 but including Exhibit 5-1). Candidates will not be tested on material that appears only in exhibits unless the exhibit is specifically identified in the *Syllabus*.
- SK** Joskow, P.L., *Cartels, Competition, and Regulation in the Property-Liability Insurance Industry*.
- SK** Krohm, G., “Implications of ISO’s Change to Loss Cost Filing for Rate Regulation,” *Journal of Insurance Regulation*, March 1990, pp. 316-329.

### **5. Ratemaking (including Classification and Profitability)**

- L** 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 exhibits unless the exhibit is specifically identified in the *Syllabus*.
- SK** 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.
- W** Feldblum, S., “A Student’s Guide to the New York Insurance Law; Article 23: Property/Casualty Insurance Rates,” CAS Study Note, 1995.
- 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.

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- SK** Harrington, S.E.; Doerpinghaus, H.I., "The Economics and Politics of Automobile Insurance Rate Classification," *Journal of Risk and Insurance*, 1993, pp. 59-84.
- SK** Williams, C.A., "Regulating Property and Liability Insurance Rates Through Excess Profits Statutes," *Journal of Risk and Insurance*, September 1983, pp. 445-472.

## 6. Shared Markets and Availability

- SK** Hamilton, K.L.; and Malecki, D.S., *Personal Insurance: Property & Liability* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1999, pp. 191-202, 307-312.
- SK** Ghezzi, T.L., "Actuarial Perspective on Property/Casualty Redlining Issues," *Actuarial Digest*, Volume 15, No. 1, February/March 1996.

## 7. Solvency Monitoring and Guaranty Funds

- L** 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*.
- W** Feldblum, S., "NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements" (excluding Section 11 and related exhibits), *PCAS LXXXIII*, 1996, pp. 297-389.
- 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).
- SK  
NEW** 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.

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## A. Accounting

Section B covers the aspects of statutory and GAAP insurance accounting and taxation as they impact reserving and statutory reporting in the US.

The material in this examination assumes a working knowledge of general accounting such as would be gained from Exam 6. If needed, a review of sections of the IASA text, CPCU 8 text, or other general accounting material may enhance the understanding of the United States specific material presented on this examination.

Candidates should gain a thorough knowledge of United States 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, and audits of insurance companies.

### READINGS

**L** Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapters 1, 2, 5, 8, 9, 10, 12-14, and 17. (For Chapter 12, only pp. 1-36 and 62-72).

**L  
NEW** *Official 2000 NAIC Annual Statement Blanks, Property and Casualty*, (both individual and consolidated basis), pp. 2-13, 15; Notes 13-19, 21-23, 27, Schedules D (exclude DA, DB, and DC), DM, F, H, 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 1999 statement. The Web version of the *Syllabus* and the *Notice of Examinations* will contain updated page references.]

**W  
NEW** 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, 1999."

**W** Feldblum, S., "Selected Notes to the Fire and Casualty Annual Statement" (Fourth Edition), CAS Study Note, April 1999.

**W** Feldblum, S., "Direct Charges and Credits to Surplus," CAS

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Study Note, April 1999.

- W** Feldblum, S., "Reinsurance Accounting: Schedule F" (Sixth Edition), CAS Study Note, August 1999.
- W** Feldblum, S., "Completing and Using Schedule P" (Third Edition), CAS Study Note, January 1996, and Addendum for 1997 and 1998 changes, 1999.
- 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.
- W** Feldblum, S., "Selected Exhibits from the Canadian Annual Statement," CAS Study Note, February 1996.
- 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).
- L  
NEW** 2000 Insurance Expense Exhibit.
- W** Feldblum, S., "The Insurance Expense Exhibit and the Allocation of Investment Income" (Fifth Edition), CAS Study Note, May 1997.
- SK** Kurz, R.M., "Uniform Classification of Expenses for Property and Liability Insurance Companies," *Insurance Accounting and Systems Association Proceedings* 1979, pp. 290-292.
- SK** The Casualty Actuarial (Technical) Task Force, National Association of Insurance Commissioners, "Clarification of Revised ALAE Definition," June 24, 1997.
- SK** Siegel, H.W., "Laws and Sausages, How Statutory Accounting Was Codified," *Contingencies*, American Academy of Actuaries, September/October 1998, pp. 36-39.
- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 46, "Accounting for Investments in Subsidiary, Controlled and Affiliated Entities," Paragraphs 1-23.

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- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 53, “Property and Casualty Contracts-Premiums.”
- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 65, “Property and Casualty Contracts,” Paragraphs 1-39.
- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 75, “Property and Casualty Reinsurance,” Paragraphs 1-14.
- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 83, “Accounting for Income Taxes,” Paragraphs 1-25.

## **Index to Text References for Exam 7-United States**

The following information is furnished for those who wish to purchase the text references cited for Exam 7-United States.

*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 2000 Annual Statement Blanks*, John S. Swift Co., Route 46, Teterboro, NJ 07608; telephone: (201) 288-2050.

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](mailto:office@casact.org); Web site: [www.casact.org](http://www.casact.org).

*Contingencies*, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.

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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](http://www.iasa.org).

Insurance Expense Exhibit, 2000, John S. Swift Co., Route 46, Teterboro, NJ 07608; telephone: (201) 288-2050.

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, The Wharton School, Colonial Penn Center, 3641 Locust Walk, Philadelphia, PA 19104-6218.

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.

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# Fellowship Examinations

## Exam 8

### Investments and Financial Analysis

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to “Materials for Study” on page 41 of this *Syllabus*. Items marked with a bold **SK** constitute the 2001 CAS Exam 8 Study Kit that is available from the CAS Office for a cost of \$10 (\$19 Canadian). Items marked with a bold **W** are available in the Syllabus section of the Students’ Corner on the CAS Web Site ([www.casact.org](http://www.casact.org)). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2001 CAS Exam 8 Web Notes—from the CAS Office for a cost of \$23 (\$38 Canadian). Information about Study Kits and Web Notes is available on page 35.

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.

Examination 8 is the culmination of the candidate’s preparation in Finance, Financial Risk, and the treatment of the insurance enterprise as a whole. Section 8A completes the treatment of Finance generally, and investments particularly, including their management. Section 8B then considers the risks from both parts of the balance sheet together, as exemplified by the section on Dynamic Financial Analysis (DFA), and also in the more traditional Asset Liability Management (ALM) and Valuation sections, and the still-developing Financial Risk Management area. In general, relevant country-specific information, such as Risk Based Capital, is covered in Exam 7. 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 modeling from Exams 3 and 4.

There are various numeric tables scattered throughout these readings, illustrating actual observations or hypothetical examples. Although candidates are responsible for understanding the concepts illustrated, they will not be responsible for the actual numeric values.

#### A. Investments

Section 8A focuses on the Investment, or Asset, side of the balance sheet. It builds upon much of the Finance material presented in Exam 2.

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The material is divided into 10 subparts. Included are a general introduction to financial instruments; asset risk; portfolio theory; CAPM, index models and arbitrage pricing; equity valuation models; valuation of bonds and the structure of interest rates; more detailed discussion of types of fixed index securities; derivatives in the form of options and futures, including the Black-Scholes option pricing model; international securities; and portfolio management.

In addition to the broad coverage of classical material, such as types of instruments, markets, structure of interest rates, and equity valuation, there is more advanced coverage of some other topics, such as arbitrage pricing theory and the Black-Scholes approach to options pricing. Mastery of this material should make the candidate well-equipped to work with professionals in the finance area, and evaluate investment material and investment choices. In concert with actual experience and appropriate ad hoc study, it also could provide a foundation for more in depth involvement in the general investment area. In general, candidates are expected to be knowledgeable about the instruments presented in the readings, their financial characteristics, their prices, their risk characteristics, and the techniques for optimizing and managing portfolios.

## READINGS

There are four texts used for Part A: *Investments* by Bodie, Kane and Marcus (1999); *Modern Portfolio Theory and Investment Analysis* by Elton and Gruber (1995) including errata; *The Handbook of Fixed Income Securities* edited by Fabozzi (2001); and *Options, Futures and Other Derivatives* by Hull (1999). In most cases, the same material is covered in two or more of these texts. Although only the chapters and sections listed will be tested directly, a candidate who would like a different and/or additional treatment of the material will find it in the other texts. Portions of the four main texts are used throughout. It is strongly suggested that the candidate read the material in the order listed, rather than reading all the material in one text, and then moving on to the next text.

### 1. Introduction: Financial Instruments and Markets

- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 2. (For background, the candidate may wish to refer to Chapter 1, but no questions will be taken from this reading.)
- L Hull, J.C., *Options, Futures, and Other Derivatives* (Fourth Edition), Prentice Hall, 1999. No required reading for this section. (For background, the candidate may wish to refer to

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Chapter 1, excluding 1.4, but no questions will be taken from this reading.)

- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 5. (For background, the candidate may wish to refer to Chapters 3 and 4, but no questions will be taken from this reading.)

## 2. Asset Risk

- L NEW Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), McGraw-Hill, 2001, Chapter 2.

## 3. Portfolio Theory

- L Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), John Wiley & Sons, 1995, Chapters 4, 5, 6 (excluding Appendices B and C), 7, 8, and 9.
- SK Errata to Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition).
- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Appendices 6A, 8B, and 8C.

## 4. CAPM, Index Models, Arbitrage Pricing

- L Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), John Wiley & Sons, 1995, Chapters 13, 14 (excluding Appendix), and 16 (pp. 368-374 only, up to, but not including, "Estimating and Testing APT").
- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 13.

## 5. Equity Valuation Models

- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 18.

## 6. Valuation of Bonds and the Structure of Interest Rates

- L NEW Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), McGraw-Hill, 2001, Chapter 4.

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- L Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), John Wiley & Sons, 1995, Chapter 20.
- SK Errata to Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition).
- L Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), McGraw-Hill, 2001, Chapter 5.

## 7. Types of Fixed Income Securities

- L NEW Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), McGraw-Hill, 2001, Chapters 8 (pp. 175-187 up to, but not including, “Agency Securities”), 9 (pp. 197-203, up to, but not including, “Revenue Bonds;” pp. 205-207, from “Hybrid and Special Bond Securities” up to, but not including “Dedicated Tax-Backed’ and ‘Structured/Asset-Backed’ Bonds;” pp. 208-220, from “Money Market Products” up to, but not including, “Tax Provisions Affecting Municipals”), 10, and 11.
- SK Altman, E.I., “Measuring Corporate Bond Mortality and Performance,” *The Journal of Finance*, Volume 44, No. 4, September 1989, pp. 909-922.
- L NEW Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), McGraw-Hill, 2001, Chapter 24.

## 8. Options and Futures

- L NEW Hull, J.C., *Options, Futures, and Other Derivatives* (Fourth Edition), Prentice Hall, 1999, Chapters 2 (excluding 2.4, 2.7, and 2.11), 3 (excluding Appendices), 4 (only 4.6, 4.11, 4.14, 4.15, and Summary), 6-10 (excluding Appendices), and 11 (excluding Appendices).
- L NEW Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), McGraw-Hill, 2001, Chapter 34.

## 9. International Securities

- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 25 (pp. 786-793 and 797-799 from “Passive and Active International Investing” up to, but not including, “Asset Allocation”).
- L Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and*

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*Investment Analysis* (Fifth Edition), John Wiley & Sons, 1995, Chapter 12 (pp. 262-276 up to, but not including, “Return Expectations and Portfolio Performance” and 279-284 from “Other Evidence on Internationally Diversified Portfolios” up to, but not including, “Models for Managing International Portfolios”).

- L** Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), McGraw-Hill, 2001, Chapter 16 (pp. 361-366 up to, but not including, “Yankee Bonds”).

## 10. Portfolio Management

- L** Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapters 16 (excluding 16.1 and 16.3) and 26 (excluding 26.1 and 26.2).

## B. Financial Analysis

Section 8B examines insurance companies’ management of financial risk from a global perspective. Asset risk and liability risk are examined together. The relatively recent Dynamic Financial Analysis approach is presented in the first section. The candidate is expected to gain an understanding of what constitutes DFA, when it is likely to be used, how to use and interpret it, and what some of the considerations are in constructing a DFA model. It is not expected that the candidate would actually be able to construct a working DFA model based solely on this material.

Asset liability management is presented in the next section. Although this is either being supplanted by, or becoming a part of, DFA, it is still very much a function explicitly, or sometimes implicitly, performed by most companies. The readings provide a reasonable exposure to this process, and the candidate should understand and be in a position to demonstrate knowledge of the issues presented, and the solutions. In the Surplus Adequacy and Financial Risk Management Section, the concept of Expected Policyholder’s Deficit is covered, and Securitization of Risk is introduced including catastrophe bonds.

In the section on Valuation, the candidate should understand the primary factors and issues in performing valuations. Finally, in the section on Portfolio Risk Models in Other Industries, the candidate is exposed to the Value at Risk concept as used in Banking.

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## READINGS

### 1. Dynamic Financial Analysis

NOTE: Some of the papers in this section discuss specific models of specific vendors. The inclusion of these papers does not imply an endorsement of these models or vendors by the Casualty Actuarial Society.

- W** CAS Committee on Dynamic Financial Analysis, "Dynamic Financial Models of Property-Casualty Insurers," *CAS Forum*, Winter 2000, pp. 317-347.
- NEW**
- W** D'Arcy, S.P.; Gorvett, R.W.; Herbers, J.A.; Hettinger, T.E.; Lehmann, S.G.; and Miller, M.J., "Building a Public Access PC-Based DFA Model," *CAS Forum*, Summer 1997, Volume 2, pp. 1-40.
- W** D'Arcy, S.P.; Gorvett, R.W.; Hettinger, T.E.; and Walling, R. J., "Using the Public Access DFA Model: A Case Study," *CAS Forum*, Summer 1998, pp. 53-118.
- W** Kirschner, G.S.; and Scheel, W.C., "Specifying the Functional Parameters of a Corporate Financial Model for Dynamic Financial Analysis," *CAS Forum*, Summer 1997, Volume 2, pp. 41-88. Although the candidate should be familiar with the information and concepts presented in the exhibits, no questions will be drawn directly from them.
- W** Lowe, S.P.; and Stanard, J.N., "An Integrated Dynamic Financial Analysis and Decision Support System for a Property Catastrophe Reinsurer," *ASTIN Bulletin*, Volume 27, Number 2, November 1997, pp. 339-371.
- W** Correnti, S.; Sonlin, S.M.; and Isaac, D.B., "Applying A DFA Model to Improve Strategic Business Decisions," *CAS Forum*, Summer 1998, pp. 15-51.

### 2. Asset Liability Management

- W** Feldblum, S., "Asset Liability Matching For Property/Casualty Insurers," *Valuation Issues, CAS Special Interest Seminar*, 1989, pp. 117-154.

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- SK** Noris, P.D., "Asset/Liability Management Strategies for Property and Casualty Companies," Morgan Stanley, May 1985, excluding Sections I, II, V, and VI.
- L** Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition), McGraw-Hill, 2001, Chapters 44 and 45.
- NEW**
- SK** Erratum to Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Sixth Edition).
- NEW**

### 3. Surplus Adequacy and Financial Risk Management

- SK** 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.
- W** Gorvett, R.W., "Insurance Securitization: The Development of a New Asset Class," *Securitization of Risk*, CAS Discussion Paper Program, May 1999, pp. 133-173.
- NEW**

### 4. Insurance Company Valuation

- W** Miccolis, R.S., "An Investigation of Methods, Assumptions, and Risk Modeling for the Valuation of Property/Casualty Insurance Companies," *Financial Analysis of Insurance Companies, CAS Discussion Paper Program*, 1987, pp. 281-321. (For background, the candidate may wish to refer to Sturgis, R.W., "Actuarial Valuation of Property/Casualty Insurance Companies," *PCAS LXVIII*, 1981, pp. 146-159, including discussions of paper: Lowe, S.P., *PCAS LXIX*, 1982, pp. 120-126; Rothman, R.; and Deutsch, R.V., *PCAS LXIX*, 1982, pp. 126-130. However, no questions will be taken from the background readings.)
- SK** Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice, No. 19, Actuarial Appraisals (Doc. No. 034)," 1991.
- W** Casualty Actuarial Society, "Statement of Principles Regarding Property and Casualty Valuations" as adopted September 22, 1989, Casualty Actuarial Society.

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## 5. Portfolio Risk Models in Other Industries

**L** Hull, J.C., *Options, Futures, and Other Derivatives* (Fourth Edition), Prentice Hall, 1999, Chapter 14 (excluding Appendix).  
**NEW**

### Index to Text References for Exam 8

The following information is furnished for those who wish to purchase the text references cited for Exam 8.

Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), 1999, Irwin McGraw-Hill, 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](mailto:office@casact.org); Web site: [www.casact.org](http://www.casact.org).

Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), 1995, John Wiley & Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

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* (Fourth Edition), 1999, Prentice Hall; telephone: (800) 374-1200; Web site: [www.prenhall.com](http://www.prenhall.com).

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## Exam 9

### Advanced Ratemaking, Rate of Return, and Individual Risk Rating Plans

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to “Materials for Study” on page 41 of this *Syllabus*. Items marked with a bold **SK** or **SKU** constitute the 2001 CAS Exam 9 Study Kit that is available from the CAS Office for a cost of \$20 (\$34 Canadian). Items marked with a bold **W** are available in the Syllabus section of the Students’ Corner on the CAS Web Site ([www.casact.org](http://www.casact.org)). Those without access to the Web may purchase a print version of the items marked with a **W**—the 2001 CAS Exam 9 Web Notes—from the CAS Office for a cost of \$47 (\$74 Canadian). The 2001 Update to the 2000 Study Kit is available at a cost of \$7 (\$14 Canadian) and includes only the items marked with a bold **SKU**. Information about Study Kits and Web Notes is available on page 35.

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. Advanced Ratemaking Techniques

Candidates for this part are expected to have 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 such as those covered in the readings listed on the next page. 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, they will deal with the types of practical problems that a fully qualified actuary working in ratemaking should be able to solve.

Advanced Ratemaking Techniques consists of four sections:

1. Classification Ratemaking Topics;
2. Excess and Deductible Rating;
3. Rate of Return; and
4. The Loading for Risk.

The readings in this part should be read for illustrations of basic principles and theories, as well as insights into advanced ratemaking problems and their solutions. In none of the readings is the derivation of formulae or

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equations to be stressed, but applications of those techniques may be required. Some readings are included primarily for their historical significance or to illustrate unique solutions to a ratemaking problem.

## READINGS

### 1. Classification Ratemaking Topics

This section deals with the establishment of classifications, class relativities, and linear credibility.

- W** 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 [ftp://www.actuary.org/pub/actuary.org/asb\\_pdf/risk .pdf](ftp://www.actuary.org/pub/actuary.org/asb_pdf/risk.pdf).]
- 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.
- SK  
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.
- 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.
- W** Holler, K.D.; Sommer, D.B.; and Trahair, G., "Something Old, Something New in Classification Ratemaking with a Novel Use of GLMs for Credit Insurance," *Casualty Actuarial Society Forum*, Winter 1999, Sections 1 and 2 and the Appendix.

### 2. Excess and Deductible Rating

This section deals with specific techniques for risk sharing between an insured and an insurer.

Candidates should have a general knowledge and understanding of deductible and excess coverages, and the problems inherent in pricing these coverages for various lines.

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- W** 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.
- 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.
- 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.
- W** Teng, M.T.S., “Pricing Workers’ Compensation Large Deductible and Excess Insurance,” *Casualty Actuarial Society Forum*, Winter 1994, pp. 413-437.
- W** Gillam, W.R.; and Snader, R.H., “Fundamentals of Individual Risk Rating,” National Council on Compensation Insurance (Study Note), 1992, Part III.

### 3. Rate of Return

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.

- W** **NEW** McClenahan, C.L., “Insurance Profitability,” *Actuarial Considerations Regarding Risk and Return in Property-Casualty Insurance Pricing*, Casualty Actuarial Society, 1999, Chapter 8.
- W** 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.
- 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.

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- W** 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.
- W** Robbin, Ira, "The Underwriting Profit Provision," CAS Study Note, as updated in 1992.
- 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.
- 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.
- W** Butsic, R.P., "Capital Allocation for Property-Liability Insurers: A Catastrophic Reinsurance Application," *Casualty Actuarial Society Forum*, Spring 1999, Sections 1, 2, 4, and 6. Candidates will not be tested on the appendices although they may be useful for reference.

#### **4. The Loading for Risk**

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

- W** Feldblum, S., "Risk Load for Insurers," *PCAS LXXVII*, 1990, pp. 160-195, including discussions of paper: Philbrick, S.W., *PCAS LXXVIII*, 1991, pp. 56-63; and Bault, T., *PCAS LXXXII*, 1995, pp. 78-96.
- SK** Stone, J.M., "A Theory of Capacity and the Insurance of Catastrophe Risks," *The Journal of Risk and Insurance*, June 1973, Volume XL Number 2, Part I, pp. 231-243, and September 1973, Volume XL Number 3, Part II, pp. 339-355.

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**W** Van Slyke, O.E., “The Cost of Capital: An Axiomatic  
**NEW** Approach,” *Actuarial Considerations Regarding Risk and Return in Property-Casualty Insurance Pricing*, Casualty Actuarial Society, 1999, Chapter 11. Candidates will not be tested on the appendices.

## **B. Individual Risk Rating**

One of the important functions performed by an actuary is the rating of 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 sections:

1. Experience Rating, which uses individual risk experience to adjust rates prospectively; and
2. Retrospective Rating, which uses subject individual risk experience to adjust premium after completion of the policy.

The readings range from those that discuss the theoretical foundation of individual risk rating to those that discuss the application of various plans.

Candidates will be expected to have a good working knowledge of credibility, loss limitation, and rate modification concepts as they apply to prospective and retrospective rating. In addition, they will be expected to have knowledge of loss distribution, insurance charge, and excess loss charge concepts as they apply to loss retention programs. 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 (excluding individual state pages) and should anticipate answering questions in the manner of an insurance consultant for an insured.

## **READINGS**

### **1. Experience Rating**

The main idea behind experience rating is to tailor the individual risk rate so it will be more nearly correct to cover the costs brought to the system by that risk. The readings begin with principles and concepts, then move to a discussion of plans in current use.

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- SK** 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.]
- W** Gillam, W.R., "Workers' Compensation Experience Rating: What Every Actuary Should Know," *PCAS LXXIX*, 1992, Sections 1-5, pp. 215-239.
- W** Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part I.
- SK** National Council on Compensation Insurance, *The 1998 Adjustment to the Experience Rating Plan: Your Guide to Understanding the Changes*.
- SKU  
NEW** National Council on Compensation Insurance, *Experience Rating Plan Manual for Workers Compensation and Employers Liability Insurance* (as of March 1, 2000). Candidates are responsible for only the excerpted material.
- SK** Insurance Services Office, Inc., *Experience and Schedule Rating Plans Applicable to General Liability*, ISO Circular GL-90-217 (Conversion to Loss Cost Basis).

## 2. Retrospective Rating

Retrospective rating allows adjustment of individual risk premium after expiration of its policy, respective of actual loss and expenses associated with the coverage. The current plans in use involve retention of loss and loss expense up to limits (both on an aggregate and on an individual occurrence basis) selected in advance.

- W** Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part II.
- SKU  
NEW** National Council on Compensation Insurance, *Retrospective Rating Plan Manual for Workers Compensation and Employers Liability Insurance* (as of July 1, 2000). Candidates are responsible for only the excerpted material.
- SK** Insurance Services Office, Inc., *Retrospective Rating Plan for Automobile, General Liability, Glass and Theft* (July 1989 edition).

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- 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.
- W** Skurnick, D., “The California Table L,” *PCAS LXI*, 1974, Section 1, pp. 117-123. Including discussion of this paper: Gillam, W.R., *PCAS LXXX*, 1993, pp. 353-365.
- W** Gillam, W.R., “Retrospective Rating: Excess Loss Factors,” *PCAS LXXVIII*, 1991, pp. 1-40. Candidates are not responsible for loss distribution formulae.

## Index to Text References for Exam 9

The following information is furnished for those who wish to purchase the text references cited for Exam 9.

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](mailto:office@casact.org); Web site: [www.casact.org](http://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, 7 World Trade Center, New York, NY 10048; telephone: (800) 888-4476.

*Journal of Risk and Insurance (The)*, American Risk and Insurance Association, The Wharton School, Colonial Penn Center, 3641 Locust Walk, Philadelphia, PA 19104-6218.

National Council on Compensation Insurance, 750 Park of Commerce Drive, Boca Raton, FL 33487; telephone: (800) NCCI-123.

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# Index to Text References

Many required readings may be downloaded free-of-charge from the Students' Corner of the CAS Web Site ([www.casact.org](http://www.casact.org)). These readings are listed as "Web Notes" in this *Syllabus*. Other readings, indicated with a bold **SK**, are available in the CAS Study Kits that may be purchased from the CAS Office. Some text references must be purchased from the publisher or a bookstore and generally are available to be borrowed from the CAS Library. Material that is new in 2001 will be made available as soon as possible. The following information is furnished for those who wish to purchase the text references cited in the examination descriptions.

Exam	Text
1, 2, 3, 4, 6	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: <a href="http://www.actexamdriver.com">www.actexamdriver.com</a> ; e-mail: <a href="mailto:retail@actexamdriver.com">retail@actexamdriver.com</a> .
1, 2, 3, 4, 6	Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: <a href="http://www.actuarialbookstore.com">www.actuarialbookstore.com</a> .
7US	<i>Actuarial Digest</i> , P.O. Box 1127, Ponte Vedra, FL 32004.
5, 6	Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.
7C	A.M. Best Canada Ltd., Suite 600, 133 Richmond Street West, Toronto, Ontario M5H 2I3, Canada; telephone: (416) 363-8266; Web site: <a href="http://www.trac.com">www.trac.com</a> .
5, 6, 7C, 7US	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., <i>Calculus: A New Horizon</i> (Sixth Edition), 1999, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.
7US	<i>Association Form of the 2000 Annual Statement Blanks</i> , John S. Swift Co., Route 46, Teterboro, NJ 07608; telephone: (201) 288-2050.

- 7C 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](http://www.carswell.com).
- 8 Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), 1999, Irwin McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; 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 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: [www.soa.org](http://www.soa.org).
- 2 Brealey, R.A.; and Myers, S.C., *Principles of Corporate Finance* (Sixth Edition), 2000, McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 2 Brigham, E.F.; and Gapenski, L.C., *Financial Management* (Ninth Edition), 1999, Harcourt Brace College Publishers, 6277 Sea Harbor Drive, Orlando, FL 32887; telephone (800) 245-8744.
- 2 Broverman, S.A., *Mathematics of Investment and Credit* (Second Edition), 1996, Mad River Books (A division of ACTEX Publications), 140 Willow Street, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: [retail@actexmadriver.com](mailto:retail@actexmadriver.com).
- 7C 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](http://www.carswell.com).
- 7C 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](http://www.actuaries.ca).



- 5-9 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](mailto:office@casact.org); Web site: [www.casact.org](http://www.casact.org).
- 7C Chamber of Commerce of the United States, 1615 H Street, N.W., Washington, DC 20062; telephone: (202) 659-6000 or (800) 638-6582.
- 7US *Contingencies*, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.
- 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* (Fifth Edition), 1997, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.
- 8 Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), 1995, John Wiley & Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.
- 7C Ettlenger, 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, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 7C 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.

- 7C *Financial Institutions Act*, “Insurance Companies Act,” Chapter 47, The Federal Publication, 388 King Street West, Toronto, Ontario M5V 1K2, Canada, telephone (416) 860-1611.
- 5, 6 *Foundations of Casualty Actuarial Science* (Third Edition), 1996, 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.
- 7C Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, 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@actexamdriver.com.
- 5 Head, G.L., *Insurance to Value*, Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, IL 60430.
- 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](http://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.
- 1 Hughes-Hallett, D.; Gleason, A.M.; and McCallum, W.G., *Calculus: Single and Multivariable* (Second Edition), 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.
- 8 Hull, J.C., *Options, Futures, and Other Derivatives* (Fourth Edition), 1999, Prentice Hall; telephone: (800) 374-1200; Web site: www.prenhall.com.

- 7C L'inspecteur general des institutions financieres, 800, place D'Youville – 8 etage, Quebec PQ G1R 4Y5 Canada; Web site: [www.igif.gouv.qc.ca](http://www.igif.gouv.qc.ca).
- 6, 7C, 7US 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](http://www.iasa.org).
- 7C, 7US Insurance Expense Exhibit, John S. Swift Co., Route 46, Teterboro, NJ 07608; telephone: (201) 288-2050.
- 7C Insurance Information Centre of Canada (formerly the Insurance Bureau of Canada), 240 Duncan Mill Road, Suite 700, Toronto, Ontario M3B 1Z4, Canada; telephone: (416) 445-5912; fax (416) 445-2183.
- 6, 7US Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.
- 5, 7C, 7US, 9 Insurance Services Office, 7 World Trade Center, New York, NY 10048; telephone: (800) 888-4476.
- 3 Jones, B.L., "Stochastic Models for Continuing Care Retirement Communities," *North American Actuarial Journal*, Volume 1, Number 1, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: [www.soa.org](http://www.soa.org).
- 7US *Journal of Insurance Regulation*, National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.
- 7US, 9 *Journal of Risk and Insurance (The)*, American Risk and Insurance Association, The Wharton School, Colonial Penn Center, 3641 Locust Walk, Philadelphia, PA 19104-6218.
- 2 Kellison, S.G., *Theory of Interest*, 1991, Irwin/McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

- 7C 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](http://www.carswell.com).
- 3, 4 Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag New York, Inc., P.O. Box 2485, Secaucus, NJ 07096-2485; telephone: (800) 777-4643; fax: (201) 348-4505.
- 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* (Fourth Edition), 1999, International Thompson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.
- 7C Linden, A.M., *Canadian Tort Law* (Sixth Edition), 1997, 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](http://www.butterworths.ca).
- 1, 2, 3, 4, 6 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@actexamdriver.com](mailto:retail@actexamdriver.com).
- 6, 7C, 7US National Association of Insurance Commissioners, 120 W. 12<sup>th</sup> Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.
- 9 National Council on Compensation Insurance, 750 Park of Commerce Drive, Boca Raton, FL 33487; telephone: (800) NCCI-123.
- 7US New York (State) Insurance Department, Publications Unit, Agency Building 1, Empire State Plaza, Albany, NY 12257; telephone: (518) 474-1203.

- 7US 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.
- 7C 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](http://www.osfi-bsif.gc.ca).
- 7C Ontario Insurance Commission, 5160 Yonge Street, PO Box 85, North York, Ontario M2N 6L9, Canada; telephone: (416) 250-7250; fax: (416) 590-7070; Web site: [www.ontarioinsurance.com](http://www.ontarioinsurance.com).
- 2 Parmenter, M.M., *The Theory of Interest and Life Contingencies with Pension Applications: A Problem-Solving Approach* (Revised Edition), Mad River Books (A division of ACTEX Publications), 140 Willow Street, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: [retail@actexmadriver.com](mailto:retail@actexmadriver.com).
- 4 Pindyck, R.S.; and Rubinfeld, D.L., *Econometric Models and Economic Forecasts* (Fourth Edition), 1998, Irwin McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 1, 2, 3, Preliminary Actuarial Examinations, P.O. Box 95600,  
4 Chicago, IL 60694-5600; telephone: (847) 706-3500; fax: (847) 706-3599.
- 7US Rejda, G.E., *Social Insurance and Economic Security* (Sixth Edition), 1999, Prentice-Hall, Inc.; telephone: (800) 374-1200.
- 2 Ross, S.A.; Westerfield, R.W.; and Jaffe, J., *Corporate Finance* (Fifth Edition), 1999, McGraw-Hill Inc., 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 1 Ross, S.M., *A First Course in Probability* (Fifth Edition), 1998, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.

- 3 Ross, S.M., *Introduction to Probability Models* (Seventh Edition), 2000, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.
- 3, 4 Ross, S.M., *Simulation* (Second Edition), 1997, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.
- 1, 2, 3, 4, 6 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](http://www.sliderulebooks.com).
- 2, 3 Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: [www.soa.org](http://www.soa.org).
- All Texas Instruments, Attention: Order Entry, PO Box 650311, Mail Station 3962, Dallas, TX 75265; telephone: (800) 842-2737; Web site: [www.ti.com](http://www.ti.com).
- 1 Thomas, G.B.; and Finney, R.L., *Calculus and Analytic Geometry* (Ninth Edition), 1996, Addison-Wesley; telephone: (800) 922-0579.
- 2 Wachtel, P., "Macroeconomics," SoA Study Note 2-21-00, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: [www.soa.org](http://www.soa.org).

# Key Deadlines

## CAS Exams 1-4

All correspondence and accompanying forms of payment for Exams 1-4 must reach Preliminary Actuarial Examinations by the stated deadlines. No exceptions will be made.

### Spring 2001

Registration	April 1, 2001
Change of Center	April 1, 2001
Refund Request	June 30, 2001

### Fall 2001

Registration	October 1, 2001
Change of Center	October 1, 2001
Refund Request	December 31, 2001

## CAS Exams 5-9

All correspondence and accompanying forms of payment for Exams 5-9 must reach the CAS Office by the stated deadlines. No exceptions will be made.

### Spring 2000

Registration	March 22, 2001
Change of Center	March 22, 2001
Refund Request	June 30, 2001
Analysis Request	July 31, 2001
Appeal	August 31, 2001

### Fall 2000

Registration	September 20, 2001
Change of Center	September 20, 2001
Refund Request	December 31, 2001
Analysis Request	January 31, 2002
Appeal	March 1, 2002

Casualty Actuarial Society  
1100 North Glebe Road, Suite 600  
Arlington, Virginia 22201-4798  
[www.casact.org](http://www.casact.org)



**Casualty Actuarial Society**  
**Spring 2001 Exam Application**  
**Exams 5, 7, and 8**

Application must reach  
the CAS Office by  
**MARCH 22, 2001**

For Office Use Only		I have previously registered for a CAS exam: <input type="checkbox"/> Yes <input type="checkbox"/> No	
ID	CAND. NO.	<b>Indicate One:</b> Prefix: <input type="checkbox"/> Mr. <input type="checkbox"/> Ms. <input type="checkbox"/> Mrs. <input type="checkbox"/> _____	
Last Name/Family Name		First Name	Middle Name
Suffix			
If a <b>different name</b> was used on a previous application, print it here:		Date of Birth <b>(Month/Day/Year)</b>	
<b>Preferred Address</b>	Please check for preferred address: <input type="checkbox"/> Home Address <input type="checkbox"/> Office Address <input type="checkbox"/> New Address		
Organization Name (only if a company address)			
Street or P.O. Box			
City	State/Province	Zip/Postal Code	Country
Business Telephone	Home Telephone	Fax	E-Mail
<b>Employer Information</b> (If not noted above)		Business E-Mail:	
Company Name			
Address			
City	State/Province	Zip/Postal Code	Country
<b>Preliminary Actuarial Exams</b>	I have credit for the following: <input type="checkbox"/> Exam 1 <input type="checkbox"/> Exam 2 <input type="checkbox"/> Exam 3 <input type="checkbox"/> Exam 4		
<b>For Full-Time Students</b>	Name of College/University	Expected Graduation Year	<input type="checkbox"/> Undergraduate <input type="checkbox"/> Graduate
<b>Exam Registration Information</b>		I am registering for the following:	
<b>Exam Center</b>	List center from back page here.	<input type="checkbox"/> <b>Exam 5</b> (Monday, April 30, 2001)	<input type="checkbox"/> <b>Exam 7-U.S.</b> (Tuesday, May 1, 2001)
		<input type="checkbox"/> <b>Exam 7-Canada</b> (Tuesday, May 1, 2001)	<input type="checkbox"/> <b>Exam 8</b> (Wednesday, May 2, 2001)
<b>Method of Payment</b>		Indicate One: <input type="checkbox"/> Personal Check <input type="checkbox"/> Company Check <input type="checkbox"/> Money Order <input type="checkbox"/> Credit Card	
If paying by credit card, please indicate the following: <input type="checkbox"/> American Express <input type="checkbox"/> Diners Club <input type="checkbox"/> Discover <input type="checkbox"/> MasterCard <input type="checkbox"/> Visa		<b>Payment Information</b>	
Account Number: _____		Exam Fee(s)	
Expiration Date: _____ Cardholder's Name _____		Fee for Center Outside U.S. or Canada	
Cardholder's Address: _____		Translation Fee	
Cardholder's Signature (Required)		<b>TOTAL</b> Amount Enclosed	
<b>Translation Service</b>	<input type="checkbox"/> To request translation service, check here and indicate language.		
<b>Mail check or money order payments to:</b> Casualty Actuarial Society P.O. Box 425 Merrifield, VA 22116-0425 U.S.A.		<b>Mail credit card payments (and all overnight/courier deliveries) to:</b> Casualty Actuarial Society 1100 North Glebe Road, Suite 600 Arlington, VA 22201-4798 U.S.A.	
"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, be disclosed to any other bona fide actuarial organization that has a legitimate interest in such results and/or actions."			
<b>Signature</b>	_____	<input type="checkbox"/> <b>Check here is you have attached a written request for accommodation to meet a special need.</b>	
Your signature is required for this application to be valid.			



## EXAMINATION CENTERS

If an examination center is canceled for any reason, students will be reassigned to the nearest available examination center. For the most current update to this list, please see the Students' Corner of the CAS Web Site at [www.casact.org](http://www.casact.org).

### UNITED STATES

**ALABAMA**  
Birmingham

**ALASKA**  
Juneau

**ARIZONA**  
Scottsdale

**ARKANSAS**  
Little Rock (Select Exams)

**CALIFORNIA**  
Los Angeles  
Novato  
San Diego  
San Mateo  
Woodland Hills

**COLORADO**  
Denver

**CONNECTICUT**  
Hartford

**DISTRICT OF COLUMBIA**  
Washington

**FLORIDA**  
Boca Raton  
Gainesville  
Jacksonville  
Miami  
Tallahassee  
Tampa

**GEORGIA**  
Atlanta

**HAWAII**  
Honolulu

**ILLINOIS**  
Bloomington  
Chicago  
Long Grove  
Moline  
Northbrook  
Schaumburg  
Springfield

**INDIANA**  
Fort Wayne  
Indianapolis

**IOWA**  
Des Moines  
Iowa City (Select Exams)

**KANSAS**  
McPhearson  
Overland Park  
Topeka (Select Exams)

**KENTUCKY**  
Louisville

**LOUISIANA**  
Baton Rouge (Select Exams)

**MAINE**  
Portland

**MARYLAND**  
Baltimore

**MASSACHUSETTS**  
Boston  
Worcester

**MICHIGAN**  
Dearborn  
Lansing

**MINNESOTA**  
Owatonna  
St. Paul

**MISSISSIPPI**  
Jackson

**MISSOURI**  
Springfield  
St. Louis

**NEBRASKA**  
Lincoln (Select Exams)  
Omaha  
South Sioux City

**NEVADA**  
Carson City (Select Exams)

**NEW HAMPSHIRE**  
Keene

**NEW JERSEY**  
Holmdel  
Princeton  
Warren

**NEW MEXICO**  
Santa Fe

**NEW YORK**  
Albany  
Buffalo  
New York City  
Utica

**NORTH CAROLINA**  
Charlotte  
Raleigh  
Winston-Salem

**NORTH DAKOTA**  
Bismark (Select Exams)  
Grand Forks

**OHIO**  
Cincinnati  
Cleveland  
Columbus  
Hamilton  
Wooster

**OKLAHOMA**  
Oklahoma City

**OREGON**  
Ashland  
Portland

**PENNSYLVANIA**  
Erie  
Harleysville (Limited Space)  
Harrisburg  
Philadelphia  
Pittsburg

**PUERTO RICO**  
Hato Rey

**RHODE ISLAND**  
Lincoln

**SOUTH CAROLINA**  
Columbia

**TENNESSEE**  
Chattanooga (Select Exams)  
Nashville

**TEXAS**  
Austin  
Dallas  
Houston  
San Antonio

**UTAH**  
Salt Lake City

**VIRGINIA**  
Richmond (Limited Space)

**WASHINGTON**  
Seattle

**WISCONSIN**  
Brookfield  
Madison  
Stevens Point  
Wausau

### CANADA

**ALBERTA**  
Calgary  
Edmonton

**BRITISH COLUMBIA**  
Vancouver

**MANITOBA**  
Winnipeg

**NEW BRUNSWICK**  
Fredericton

**NEW FOUNDLAND**  
St. John's

**ONTARIO**  
London (Select Exams)  
Ottawa  
Toronto

**QUEBEC**  
Montreal  
Quebec City

**SASKATCHEWAN**  
Saskatoon

### OTHER COUNTRIES

**BAHAMAS**, Nassau

**BARBADOS**

**BERMUDA**, Hamilton

**CHINA, PEOPLE'S  
REPUBLIC OF**  
Guangzhou  
Hong Kong  
Shanghai

**CHINA, REPUBLIC OF  
(TAIWAN)**  
Taipei

**CYPRUS**, Nicosia

**ENGLAND**, London

**FRANCE**, Paris

**GREECE**, Athens

**INDIA**, Calcutta

**ISRAEL**, Tel-Aviv

**JAPAN**, Tokyo

**JAMAICA**, Kingston

**KENYA**, Nairobi

**KOREA**, Seoul

**MALAYSIA**, Kuala Lumpur

**PAKISTAN**

Lahore  
Karachi

**SINGAPORE**, Singapore  
City

**SOUTH AFRICA**, Cape  
Town

**SRI LANKA**, Columbo

**SWITZERLAND**, Zurich

**TRINIDAD**, Port-of-Spain

**UNITED ARAB EMIRATES**  
Sharjah

**ZIMBABWE**, Harare



**Casualty Actuarial Society**  
**Fall 2001 Exam Application**  
**Exams 6 and 9**

Application must reach  
the CAS Office by  
**SEPTEMBER 20, 2001**

For Office Use Only		I have previously registered for a CAS exam: <input type="checkbox"/> Yes <input type="checkbox"/> No	
ID	CAND. NO.	<b>Indicate One:</b> Prefix: <input type="checkbox"/> Mr. <input type="checkbox"/> Ms. <input type="checkbox"/> Mrs. <input type="checkbox"/> _____	
Last Name/Family Name		First Name	Middle Name
Suffix			
If a <b>different name</b> was used on a previous application, print it here:		Date of Birth (Month/Day/Year)	
<b>Preferred Address</b>		Please check for preferred address: <input type="checkbox"/> Home Address <input type="checkbox"/> Office Address <input type="checkbox"/> New Address	
Organization Name (only if a company address)			
Street or P.O. Box			
City	State/Province	Zip/Postal Code	Country
Business Telephone	Home Telephone	Fax	E-Mail
<b>Employer Information</b> (If not noted above)		Business E-Mail:	
Company Name			
Address			
City	State/Province	Zip/Postal Code	Country
<b>Preliminary Actuarial Exams</b>		I have credit for the following: <input type="checkbox"/> Exam 1 <input type="checkbox"/> Exam 2 <input type="checkbox"/> Exam 3 <input type="checkbox"/> Exam 4	
<b>For Full-Time Students</b>		Name of College/University	Expected Graduation Year
<b>Exam Registration Information</b>		I am registering for the following:	
<b>Exam Center</b>	List center from back page here.	<input type="checkbox"/> <b>Exam 6</b> (Tuesday, October 30, 2001) <input type="checkbox"/> <b>Exam 9</b> (Wednesday, October 31, 2001)	
<b>Method of Payment</b>		Indicate One: <input type="checkbox"/> Personal Check <input type="checkbox"/> Company Check <input type="checkbox"/> Money Order <input type="checkbox"/> Credit Card	
If paying by credit card, please indicate the following: <input type="checkbox"/> American Express <input type="checkbox"/> Diners Club <input type="checkbox"/> Discover <input type="checkbox"/> MasterCard <input type="checkbox"/> Visa		<b>Payment Information</b>	
Account Number: _____		Exam Fee(s)	
Expiration Date: _____ Cardholder's Name _____		Fee for Center Outside U.S. or Canada	
Cardholder's Address: _____		Translation Fee	
Cardholder's Signature (Required)		<b>TOTAL</b> Amount Enclosed	
<b>Translation Service</b> <input type="checkbox"/> To request translation service, check here and indicate language.			
<b>Mail check or money order payments to:</b> Casualty Actuarial Society P.O. Box 425 Merrifield, VA 22116-0425 U.S.A.		<b>Mail credit card payments (and all overnight/courier deliveries) to:</b> Casualty Actuarial Society 1100 North Glebe Road, Suite 600 Arlington, VA 22201-4798 U.S.A.	
"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, be disclosed to any other bona fide actuarial organization that has a legitimate interest in such results and/or actions."			
<b>Signature</b> _____		<input type="checkbox"/> <b>Check here is you have attached a written request for accommodation to meet a special need.</b>	
Your signature is required for this application to be valid.			

# Key Deadlines

## CAS Exams 1-4

All correspondence and accompanying forms of payment for Exams 1-4 must reach Preliminary Actuarial Examinations by the stated deadlines. No exceptions will be made.

### Spring 2001

Registration	April 1, 2001
Change of Center	April 1, 2001
Refund Request	June 30, 2001

### Fall 2001

Registration	October 1, 2001
Change of Center	October 1, 2001
Refund Request	December 31, 2001

## CAS Exams 5-9

All correspondence and accompanying forms of payment for Exams 5-9 must reach the CAS Office by the stated deadlines. No exceptions will be made.

### Spring 2000

Registration	March 22, 2001
Change of Center	March 22, 2001
Refund Request	June 30, 2001
Analysis Request	July 31, 2001
Appeal	August 31, 2001

### Fall 2000

Registration	September 20, 2001
Change of Center	September 20, 2001
Refund Request	December 31, 2001
Analysis Request	January 31, 2002
Appeal	March 1, 2002

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