

CASUALTY ACTUARIAL SOCIETY

Mary Frances Miller
Vice President-Admissions

Thomas G. Myers
Chairperson
Examination Committee

Examination Committee
General Officers
Jeffrey A. Englander
Beth E. Fitzgerald
Larry A. Haefner
Glenn G. Meyers
Arlene F. Woodruff
Richard P. Yocius

Exam 5

Introduction to Property and
Casualty Insurance and Ratemaking

April 30, 2001

4 HOURS

INSTRUCTIONS TO CANDIDATES

1. This 100 point examination consists of 48 questions divided into two sections. Section I contains 17 multiple choice questions worth one point each. Section II contains 31 problem and essay questions worth a total of 83 points.
2. To answer the multiple choice questions, use the short-answer card provided and a number 2 or HB pencil. Mark your short-answer card during the examination period. No additional time will be allowed for this after the exam has ended. Please make your marks dark and fill in the spaces completely. Fill in that it is Spring 2001, and the exam number 5.

Darken the spaces corresponding to your Candidate ID number. Five rows are available. If your Candidate ID number is fewer than 5 digits, include leading zeros. (For example, if your Candidate ID number is 987, consider that your Candidate ID number is 00987, enter a zero on the first row, a zero on the second row, 9 on the third row, 8 on the fourth row, and 7 on the fifth [last] row.) Please write in your Candidate ID number next to the place where you darken the spaces for your Candidate ID number. Your name, or any other identifying mark, must not appear on the short-answer card.

For each of the multiple choice questions, select the one best answer and fill in the corresponding letter. One quarter of the point value of the question will be subtracted for each incorrect answer. No points will be added or subtracted for responses left blank.

3. For the problem and essay questions, the number of points for each full question or part of a question is indicated at the beginning of the question or part. Answer these questions on the lined sheets provided in your Examination Envelope. Use dark pencil or ink.

Write your Candidate ID number and the examination number, 5, at the top of each answer sheet. Your name, or any other identifying mark, must not appear.

Do not answer more than one question on a single sheet of paper. Write on only the lined side of the paper, and be careful to give the number of the question you are answering on each sheet.

The answer should be concise and confined to the question as posed. When a list of a specific size is requested, do not offer more items in your list than the number requested. For example, if you are requested to list three items, only the first three responses will be graded.

CONTINUE TO NEXT PAGE OF INSTRUCTIONS

In order to receive full credit or to maximize partial credit on mathematical and computational questions, you must clearly outline your approach in either verbal or mathematical form, showing calculations where necessary.

4. Do all problems until you reach the last page of the examination where "END OF EXAMINATION" is marked.
5. Your Examination Envelope is pre-labeled with your Candidate ID number, name, exam number, and test center. Do not remove this label. Keep a record of your Candidate ID number for future inquiries regarding this exam.
6. At the beginning of the examination, check through the exam booklet for any missing or defective pages. The supervisor has additional exams for those candidates who have defective exam booklets.
7. Candidates must remain in the examination center until two hours after the start of the examination. You may leave the examination room to use the restroom with permission from the supervisor. To avoid excessive noise during the end of the examination, candidates may not leave the exam room during the last fifteen minutes of the examination.
8. At the end of the examination, place the short-answer card and all answer sheets in the Examination Envelope. Please insert your answer pages in your envelope in question number order. Insert a numbered page for each question, even if you have not attempted to answer that question. BEFORE YOU TURN THE EXAMINATION ENVELOPE IN TO THE SUPERVISOR, BE SURE TO SIGN IT IN THE SPACE PROVIDED ABOVE THE CUT-OUT WINDOW.

Anything written in the examination booklet will not be graded. Only the short-answer card and the answer sheets will be graded.

9. If you have brought a self-addressed, stamped envelope, you may put the examination booklet and scrap paper inside and submit it separately to the supervisor. It will be mailed to you. (Do not put the self-addressed stamped envelope inside the Examination Envelope.)

If you do not have a self-addressed, stamped envelope, please place the examination booklet in the Examination Envelope and seal the envelope. You may not take it with you. Do not put scrap paper in the Examination Envelope. The supervisor will collect your scrap paper.

Candidates may obtain a copy of the examination by contacting the CAS Office.

All extra answer sheets, scrap paper, etc., must be returned to the supervisor for disposal.

10. Candidates must not give or receive assistance of any kind during the examination. Any cheating, any attempt to cheat, assisting others to cheat, or participating therein, or other improper conduct will result in the Casualty Actuarial Society disqualifying the candidate's paper, and such other disciplinary action as may be deemed appropriate within the guidelines of the CAS Policy on Examination Discipline.

CONTINUE TO NEXT PAGE OF INSTRUCTIONS

11. An examination survey and postage-paid reply envelope are included with the examination. No postage is necessary for surveys mailed within the United States. Candidates mailing the survey outside the United States should use the courtesy reply envelope distributed by your exam supervisor. Please complete the survey and leave it with the examination supervisor, or take the survey and envelope with you when leaving the examination center. Please submit the survey to the CAS Office by May 25, 2001. Please do not enclose the survey in the Examination Envelope.

END OF INSTRUCTIONS

EXAM 5, SPRING 2001, SECTION I

SECTION I, QUESTIONS 1 – 17, MULTIPLE CHOICE QUESTIONS (1 POINT EACH).

1. Based on McClenahan, "Ratemaking," chapter 2, Foundations of Casualty Actuarial Science, and the following data, determine the indicated rate per unit of exposure.

<u>Accident Year</u>	<u>Developed & Trended Loss & ALAE</u>	<u>Earned Exposures</u>
1998	\$15,180	210
1999	\$20,340	260
2000	\$25,870	370

- Fixed expense per exposure \$20
- Variable expense factor 15%
- Profit and contingencies factor 2%

- A. Less than \$107
- B. At least \$107, but less than \$109
- C. At least \$109, but less than \$111
- D. At least \$111, but less than \$113
- E. At least \$113

2. Based on McClenahan, "Ratemaking," chapter 2, Foundations of Casualty Actuarial Science, and the following information, answer the question below.

Assume:

- Experience period is accident year 1999.
- Indicated rates will become effective July 1, 2001.
- The next scheduled rate increase is expected to become effective April 1, 2002.
- All policies are expected to have an 18-month period.
- There are no seasonal effects on the frequency of accidents.
- Policies are evenly written throughout the year.

How many months are there between the midpoint of the experience period and the midpoint of the exposure period?

- A. Less than 22 months
- B. At least 22 months, but less than 28 months
- C. At least 28 months, but less than 34 months
- D. At least 34 months, but less than 40 months
- E. At least 40 months

EXAM 5, SPRING 2001, SECTION I

3. According to the Statement of Principles Regarding Property and Casualty Insurance Ratemaking, which of the following statements is true?
- A. Unallocated loss adjustment expenses are the claim settlement costs directly assignable to specific claims.
 - B. Taxes, licenses, and fees exclude federal income taxes.
 - C. Policyholder dividends are a return of premium not assigned as an expense.
 - D. Allocated loss adjustment expenses include all costs associated with the settlement of claims.
 - E. General administrative expenses are all costs, except commission and brokerage costs, associated with the acquisition of business.
4. According to the Statement of Principles Regarding Property and Casualty Insurance Ratemaking, which of the following statements is true?
- A. Consideration should be given to changes in case reserving that affect the continuity of the experience.
 - B. Consideration should be given to the determination of an appropriate exposure unit or premium basis, although it is not essential.
 - C. Ratemaking is retrospective because the property and casualty insurance rate must be developed after the transfer of risk.
 - D. Credibility is generally increased by making groupings more heterogeneous due to the diversification benefit from combining uncorrelated items.
 - E. Changes in policy provisions, such as coordination of benefits and second injury fund recoveries, are outside the scope of ratemaking data and thus need not be considered in ratemaking methodologies.
5. According to Bouska, "Exposure Bases Revisited," which of the following reasons is given for ISO's changing of General Liability exposure base from area to receipts?
- A. Sensitivity to inflation
 - B. Eliminated interpretive mismatch
 - C. Receipts provide a more uniform exposure base to losses than area
 - D. Eliminated temporal mismatch
 - E. Eliminated sensitivity to economic cycles

EXAM 5, SPRING 2001, SECTION I

6. Bouska, "Exposure Bases Revisited," notes that two serious problems arise from insurance company practices in the application of exposure bases. Which of the following is one of the serious problems described by Bouska?
- A. Different insurers use different exposure bases, creating confusion in the market.
 - B. Exposure estimates can be and are manipulated in response to the competitive situation.
 - C. Exposure bases change frequently, which creates distortions in ratemaking analyses.
 - D. Geographic and social differences across the U.S. make exposure bases less relevant in some areas relative to others.
 - E. None of A, B, C, D are true.
7. Based on Head, Insurance to Value, and the following information, calculate the ratio of the pure premium rate per \$100 for a 60% coinsurance clause to the pure premium rate per \$100 for a 40% coinsurance clause.

<u>Loss, as a Percentage of Total Property Value</u>	<u>Unconditional Probability of a Loss in Interval</u>	<u>Arithmetic Mean Loss in Interval, as a Percent of Total Value</u>
Less than or equal to 20%	0.050	12%
21% to 40%	0.025	30%
41% to 60%	0.015	52%
61% to 80%	0.007	75%
80% to 100%	0.003	95%

- A. Less than 0.65
- B. At least 0.65, but less than 0.75
- C. At least 0.75, but less than 0.85
- D. At least 0.85, but less than 0.95
- E. At least 0.95

EXAM 5, SPRING 2001, SECTION I

8. Based on Insurance Services Office, Inc., Personal Automobile Policy (Edition 6-98) and the following information, determine the total payment to be made by ABC Insurance Company due to an accident in which its insured is found liable.

Costs associated with accident:

\$15,000 bodily injury liability
\$10,000 property damage liability
\$250 bail bond
\$12,000 defense costs

ABC's insured carries combined single limits of \$25,000.

- A. \$15,000
B. \$25,000
C. \$25,250
D. \$37,000
E. \$37,250
9. According to Insurance Services Office, Inc., Personal Automobile Policy (Edition 6-98), under which circumstance would an insured's Medical Payments coverage pay for medical expenses?
- A. The insured's son is injured when his hand is caught in the closing door of the insured's car.
B. The insured is injured while riding a three-wheeled all-terrain vehicle on a public roadway.
C. The insured is injured while riding a three-wheeled all-terrain vehicle on his private property.
D. The insured's neighbor is injured when he is accidentally struck by the insured's car as the insured backs out of the driveway.
E. The insured's neighbor is injured when the insured purposefully strikes him with his car after an altercation.
10. According to Insurance Services Office, Inc., Personal Automobile Policy (Edition 6-98), an insured seeking coverage under Part A – Liability Coverage must do all of the following except:
- A. Cooperate with the insurer in the investigation of any claim
B. Promptly send copies to the insurer of any legal papers received in connection with the loss
C. Promptly notify the police if a hit-and-run driver is involved
D. Submit to examination under oath
E. Authorize the insurer to obtain medical reports

EXAM 5, SPRING 2001, SECTION I

11. Based on Feldblum, "Personal Automobile Premiums: An Asset Share Pricing Approach for Property-Casualty Insurance," and the following information, calculate the termination rate for the third year.

- Number of policies originally issued = 1,000
- Number of first-year lapses = 350
- Number of second-year lapses = 200
- Number of third-year lapses = 100

- A. Less than 12%
- B. At least 12%, but less than 16%
- C. At least 16%, but less than 20%
- D. At least 20%, but less than 24%
- E. At least 24%

12. According to Feldblum, "Personal Automobile Premiums: An Asset Share Pricing Approach for Property-Casualty Insurance," which of the following is false.

- A. Asset share pricing determines rates, not rate revisions.
- B. Life insurance policy claim rates are more certain than property-casualty policy claim rates.
- C. It is appropriate to assume the same pattern of persistency ratios for both direct writers and independent agency companies.
- D. A level commission structure is inappropriate for the persisting and profitable risks.
- E. The dominant market share of the direct writers makes asset share pricing a more appropriate model for personal automobile insurance.

13. Based on Tiller, "Individual Risk Rating Study Note," and the following data, calculate the Adjusted Expected Loss & ALAE Ratio.

• D-ratio	0.624
• Off-balance factor	1.050
• Subject Premium	\$ 80,000
• Total Limits Earned Premium	\$100,000
• Expected Basic Limits Losses & Unlimited ALAE	\$ 60,000
• Expected Total Limits Losses & Unlimited ALAE	\$ 74,500

- A. Less than 42.0%
- B. At least 42.0%, but less than 44.0%
- C. At least 44.0%, but less than 46.0%
- D. At least 46.0%, but less than 48.0%
- E. At least 48.0%

EXAM 5, SPRING 2001, SECTION I

14. According to "Actuarial Standard of Practice No. 13: Trending Procedures in Property/Casualty Insurance Ratemaking," which of the following items should be considered in the trending procedure used in ratemaking for private passenger automobile insurance?
- A. A decrease in automobile usage due to rising gas prices
 - B. The introduction of higher policy limits
 - C. A recently enacted tort reform that strengthens the verbal threshold for lawsuits
 - D. Changes in price levels in the economy as measured by external indices such as the Consumer Price Index
 - E. All of the above should be considered.
15. Based on Feldblum, "Workers' Compensation Ratemaking," and the following information, compute the policy year reported premium development factor from 12 to 24 months.
- Final audit occurs 3 months after policy expiration.
 - On average, audits result in 15% additional premium.
 - Premium writings are even throughout the year.
 - All policies are annual.
- A. Less than 1.050
 - B. At least 1.050, but less than 1.075
 - C. At least 1.075, but less than 1.100
 - D. At least 1.100, but less than 1.125
 - E. At least 1.125

EXAM 5, SPRING 2001, SECTION I

16. According to Moncher, "Study Note: NCCI Data Collection Calls and Statistical Plans," which of the following types of costs is considered ALAE in the NCCI Workers Compensation Statistical Plan?
- A. Medical exams incurred for the benefit of the claimant
 - B. Vocational rehabilitation evaluation expenses, if these services are purchased from an outside vendor
 - C. A carrier's penalties for reasons beyond its control that accrue as benefits to the claimant
 - D. A carrier's penalties for reasons within its control that accrue as benefits to the claimant
 - E. None of the above
17. Based on Boor, "The Complement of Credibility," and the following information, calculate the complement of credibility for class 2.

<u>Class</u>	<u>Indicated Loss Cost Rate</u>	<u>Current Loss Cost Rate</u>	<u>Complement of Credibility</u>
1	150	120	140
2	160	150	

- A. Less than 155
- B. At least 155, but less than 170
- C. At least 170, but less than 185
- D. At least 185, but less than 200
- E. At least 200

EXAM 5, SPRING 2001, SECTION II

SECTION II, QUESTIONS 18-48, WRITTEN ANSWER QUESTIONS.

18. (4 points)

According to Wiening and Malecki, Insurance Contract Analysis, exclusions are said to serve at least six legitimate purposes. State four of these purposes, and for each one, describe an exclusion used for that purpose.

19. (3 points)

According to Hamilton and Malecki, Personal Insurance: Property and Liability, answer the questions below.

a. (1 point)

State two weaknesses in the traditional tort recovery process that contributed to the development of no-fault insurance.

b. (1 point)

Describe one of the two options for determining whether an injured party can file suit for non-economic damages in no-fault states, and give one weakness of this option.

c. (1 point)

State four benefits commonly provided in a modified no-fault state.

20. (2 points)

Hamilton and Malecki, Personal Insurance: Property and Liability, discuss the two types of compensatory damages.

a. (1 point)

Describe each of the two types of compensatory damages.

b. (1 point)

Give an example for each of the two types of compensatory damages described in your answer to part a.

EXAM 5, SPRING 2001, SECTION II

21. (2 points)

Based on the Health Insurance Association of America, Group Life and Health Insurance – Part C, answer the questions below.

a. (1 point)

How do Health Maintenance Organizations, Preferred Provider Organizations, and Point of Service plans use primary care providers and restrictions on in-network and out-of-network benefits to help control costs?

b. (1 point)

Which of the three types of plans has the lowest employer costs and why?

22. (4 points)

Use the methodology presented in Burger et al., “Incorporating a Hurricane Model into Property Ratemaking,” and the following information, to answer the questions below. Show all work.

Accident Year	Developed Non-Hurricane Losses on a \$250 Deductible Level	Non-Hurricane Excess Losses on a \$250 Deductible Level	Earned House Years	Current Cost/Amount Factor	Classification and Coverage Factor	Accident Year Weights
1997	300,000	0	1,400	1.02	1.185	.20
1998	372,000	22,000	1,500	1.01	1.252	.30
1999	456,500	36,500	1,600	1.00	1.341	.50

- Loss Adjustment Expense Factor = 1.15
- Non-Hurricane Excess Wind Factor = 1.10
- Composite Projection Factor = 1.05
- Average Modeled Hurricane Loss Cost = \$ 99.95
- Current Base Class Loss Cost = \$300.00

a. (2 points)

Calculate the weighted prospective non-hurricane base class loss cost.

b. (1 point)

Calculate the modeled hurricane base class loss cost.

c. (1 point)

Calculate the indicated loss cost change.

EXAM 5, SPRING 2001, SECTION II

23. (2 points)

In his paper "Personal Automobile Premiums: An Asset Share Pricing Approach," Feldblum gives four reasons for the relationship between the duration of an auto policy and the claim frequency for that policy. State and explain these four reasons.

24. (3 points)

Based on Feldblum, "Workers' Compensation Ratemaking," and the following information, calculate the involuntary market burden. Show all work.

Pool premium	=	\$10,000,000
Undiscounted pool losses	=	\$8,500,000
Servicing carrier allowance	=	\$600,000
Administrative expenses	=	\$1,500,000
Producer fees	=	\$1,000,000
Investment income	=	\$350,000

- Undiscounted losses are developed to ultimate value.
- Due to higher premium deposits, 10% of the involuntary risks are expected to seek coverage in the voluntary market.
- 5%, or \$2.5 million of voluntary market premium is expected to leave for self-insurance.

25. (2 points)

Based on Tiller, "Individual Risk Rating," chapter 3 of Foundations of Casualty Actuarial Science, briefly describe internal and external manipulation with regard to individual risk rating systems and give an example of each.

26. (2 points)

Based on Tiller, "Individual Risk Rating," chapter 3 of Foundations of Casualty Actuarial Science, discuss the pros and cons of prospective and retrospective individual risk rating systems with respect to each of the following four factors:

- Responsiveness to changes in the experience period
- Stability of costs
- Incentive for risk control
- Timing of payments from the insured

EXAM 5, SPRING 2001, SECTION II

27. (2 points)

Boor, "A Macroeconomic View of the Insurance Marketplace," describes the ultimate result of a certain "basic truth of insurance underwriting" as the establishment of more and more refined risk classification systems.

State this "basic truth of insurance underwriting" and briefly describe how it leads to more refined classification systems.

28. (2 points)

According to Boor, "The Impact of the Insurance Economic Cycle on Insurance Pricing," there are two diametrically opposed strategies for responding to the insurance economic cycle.

Briefly describe each strategy and the effects each will have on the book of business insured, the company's pricing, underwriting expenses, and profitability during the various phases of the insurance economic cycle.

29. (2 points)

Based on Prevosto, "Study Note: ISO Statistical Plans," answer the questions below.

a. (1 point)

State the two broad categories of exposure bases used for General Liability insurance, and give an example of each.

b. (1 point)

State the two measures of exposure for Homeowners insurance and describe how each is calculated from the unit statistical plan information.

EXAM 5, SPRING 2001, SECTION II

30. (3 points)

Based on Malecki and Flitner, Commercial Liability Insurance and Risk Management, answer the questions below.

a. (2 points)

There are four essential elements of negligence that a plaintiff must establish to successfully sue for damages. State these four essential elements.

b. (1 point)

Generally, an employer is not vicariously liable for torts committed by an independent contractor. There are two major exceptions to this rule. State these two exceptions.

31. (2½ points)

According to Malecki et al., Commercial Liability Insurance and Risk Management, four common types of suits are covered by employers liability coverage.

State and briefly describe three of the common types of suits covered by employers liability coverage.

32. (2 points)

Based on Trupin and Flitner, Commercial Property Insurance and Risk Management, state four types of **property** insurance that can be included in a Commercial Package Policy (CPP).

33. (3 points)

Webb et al., Insurance Operations, describe four major factors constraining a company's underwriting policy. State and describe three of these four constraints that a company should consider before making a change to its underwriting policy.

EXAM 5, SPRING 2001, SECTION II

34. (3 points)

According to Webb et al., Insurance Operations, the responsibility for establishing a case reserve typically falls on the individual adjuster, supervisor, or claim examiner.

a. (1½ points)

Describe the three standard methods used to establish a case reserve.

b. (1½ points)

Explain what is meant by "stairstepping" case reserves and describe two problems with this practice.

35. (2 points)

a. (1 point)

Based on Webb et al., Insurance Operations, and the following information, calculate the trade basis combined ratio and the financial basis combined ratio. Show all work.

Written Premium	\$20,000,000
Earned Premium	\$18,000,000
Underwriting Expenses	\$6,000,000
Paid Losses	\$9,000,000
Incurred Losses	\$12,000,000

b. (1 point)

According to Webb et al., Insurance Operations, explain why comparisons between insurers using a trade basis combined ratio may be misleading.

EXAM 5, SPRING 2001, SECTION II

36. (7 points)

Based on McClenahan, "Ratemaking," chapter 2, Foundations of Casualty Actuarial Science, and the following data, answer the questions below.

<u>Class</u>	<u>Current Relativity to Class 1</u>	<u>On-Level Earned Premium</u>	<u>Experience Loss and ALAE</u>
1	1.00	\$50,000	\$30,000
2	1.25	\$20,000	\$10,560
3	1.50	\$30,000	\$16,200

- Existing base rate is \$100.
- Indicated statewide rate level increase is 10%.
- Class 1 is the base class.

a. (1 point)

Calculate the indicated classification relativities for class 2 and class 3. Show all work.

b. (2 points)

Calculate the off-balance factor and revised base rate required to achieve the overall indicated statewide rate level increase. Show all work.

c. (2 points)

Assume that regulatory restrictions limit any class rate changes to $\pm 15\%$. Calculate the revised base rate and classification relativities that will satisfy the regulatory restrictions and still achieve the overall indicated statewide rate level change. Show all work.

d. (1 point)

Legislatures may establish restrictions on rate variations or even completely abolish the use of certain rating variables. Finger, "Risk Classification," chapter 5, Foundations of Casualty Actuarial Science, discusses four effects of restrictions on rating variables. State two of these and briefly describe how they would result from the regulatory restrictions in part c. above.

e. (1 point)

Based on Finger, "Risk Classification," chapter 5, Foundations of Casualty Actuarial Science, describe two ways a company may react to counter the effects due to the abolition of a rating variable.

EXAM 5, SPRING 2001, SECTION II

37. (4 points)

Based on McClenahan, "Ratemaking," chapter 2, Foundations of Casualty Actuarial Science, and the following data, answer the questions below. Show all work.

Accident Year	Earned Exposures	Reported On-Level Earned Premium	Loss and ALAE as of December 31, 2000	Reported Claims as of December 31, 2000	Development Factors	
					Losses	Claims
1998	400	\$100,000	\$ 90,000	60	1.00	1.00
1999	572	\$110,000	\$124,800	70	1.05	1.20
2000	680	\$120,000	\$ 88,300	70	1.80	1.40

Calendar Year 2000 Data

Written Premium	\$100,000
Earned Premium	\$ 90,000
Incurred Loss & ALAE	\$ 55,000
ULAE	\$ 2,750
Commissions	\$ 16,000
Taxes, Licenses, & Fees	\$ 4,000
Other Acquisition Expenses	\$ 6,000
General Expenses	\$ 4,500
Profit Provision	6%

- Rates will be in effect for one year.
- Rate change effective date is October 1, 2001.
- Assume all policies are annual.

a. (½ point)

Calculate the target loss ratio.

b. (1½ points)

Calculate the frequency and severity trends (assume trends are exponential).

c. (1½ points)

Calculate the average trended experience loss ratio.

d. (½ point)

Calculate the indicated statewide rate level change.

EXAM 5, SPRING 2001, SECTION II

38. (2 points)

Using the parallelogram method described by McClenahan in "Ratemaking," chapter 2, Foundations of Casualty Actuarial Science, determine the calendar year 1999 on-level earned premium. Show all work.

<u>Calendar Year</u>	<u>Earned Premium</u>	<u>Effective Date</u>	<u>Rate Change</u>
1997	\$10,000	July 1, 1997	+5.2%
1998	\$11,500	No Change	No Change
1999	\$14,000	April 1, 1999	+7.4%

- All policies are 2-year policies.
- Policies are written uniformly throughout the year.

39. (2½ points)

Using the coefficient of variation approach described by Finger in "Risk Classification," chapter 5, Foundations of Casualty Actuarial Science, and the following information, answer the questions below.

<u>Class</u>	<u>Exposures</u>	<u>Expected Value of Losses</u>
A	200	50
B	700	100
C	100	500

- The insured population has a coefficient of variation of 1.00.
- Both the classification system and the insured population have the same mean costs.
- Class B is the base class.

a. (1½ points)

Calculate the coefficient of variation and the efficiency of this classification system. Show all work.

b. (½ point)

What is the underlying key to designing a highly efficient classification system?

c. (½ point)

Explain one social implication of using a rate structure that results in high efficiencies.

EXAM 5, SPRING 2001, SECTION II

40. (2 points)

Based on Graves & Castillo, "CGL Ratemaking," and the following information by Type of Policy and Class Group, determine the overall indicated rate change. Show all work.

- The overall indicated rate change for Policy Type A is 10%.
- Premium at Present Rate Level:

Type of Policy	Class Group				
	1	2	3	4	Total
A	100	500	300	900	1,800

- Indicated Change in Type of Policy Relativity Factor:

Type of Policy	Indicated Change
A	0.90
B	1.02
C	0.99

- Indicated Change in Class Group Relativity:

Class Group			
1	2	3	4
1.10	0.90	1.00	0.90

41. (2 points)

Based on Kelley, "Homeowners Insurance to Value – An Update," and the following information, calculate the reduction in loss per policy in 2001 which results from non-renewing the in-force policies with unrepaired roof damages. Show all work.

Expected 2001 statewide average loss cost per policy, if all policies are renewed	\$300
Percentage of total policies with unrepaired roofs	10%
Expected percentage of total claims on policies with unrepaired roof damages resulting from unrepaired roofs	30%
Expected ratio of severity on claims resulting from unrepaired roofs to severity for all other claims	40%

EXAM 5, SPRING 2001, SECTION II

42. (3 points)

McCarthy, "Premium Trend Revisited," argues that bias in rate indications can be caused by both:

- traditional homeowners ratemaking methodologies, which rely exclusively on external indices such as the Boeckh or Modified CPI indices to predict pure premium trends
- premium trends that measure changes in the company's average coverage amounts

Based on McCarthy's discussion, answer the following questions.

a. (1 point)

State two reasons McCarthy gives to explain why the external indices are not an appropriate basis for pure premium trends.

b. (1 point)

Explain what is missing in the traditional premium trend procedure and what McCarthy recommends as a solution.

c. (1 point)

Using the following data, calculate the annual premium trend that McCarthy would suggest for the company's homeowners indications. Show all work.

Annual Change in the Boeckh index of construction costs: +10%

<u>Calendar Year</u>	<u>Earned Premium at Collected Levels</u>	<u>Earned Premium at Present Rate Levels</u>	<u>Exposures</u>
1996	100,000	100,000	1,000
1997	110,000	121,000	1,050
1998	121,000	146,000	1,100
1999	133,000	175,000	1,150

EXAM 5, SPRING 2001, SECTION II

43. (3 points)

Based on Schofield, "Going from a Pure Premium to a Rate," and the following data for Private Passenger Auto BI Liability coverage, calculate the expense fee. Show all work.

- The Base Rate for Territory A is \$300.

Exposure Distribution

Territory	Increased Limits Factor		
	20/40	50/100	100/300
A	100	250	150
B	50	100	50
C	50	150	100

Territorial Relativities

Territory	Relativity
A	1.000
B	1.500
C	0.800

BI Limits Factors

BI Limit	Increased Limits Factor
20/40	1.000
50/100	1.250
100/300	1.600

Expense Summary

Expense Type	Expense as % of Premium	Portion of Expense that is Fixed
Commission	10.0	0%
Other Acquisition	8.0	75%
General	4.0	100%
Taxes, Licenses, and Fees	3.0	0%
Profit and Contingencies	5.0	0%

CONTINUED ON NEXT PAGE

EXAM 5, SPRING 2001, SECTION II

44. (3 points)

Based on Brown and Schmitz, "Study Note on Deductibles," answer the questions below.

a. (1 point)

There are four reasons why the use of large deductible policies has increased over the last five to ten years. State these four reasons.

b. (2 points)

For each of the four reasons stated in your answer to part a. above, briefly explain why that factor caused increased use of large deductible policies.

45. (2 points)

Based on Lange, "The Interpretation of Liability Increased Limit Statistics," answer the questions below.

a. (1 point)

What are the two reasons why increased limits loss trends are greater than basic limits loss trends?

b. (1 point)

Using the following data, calculate the total limits trend, basic limits trend, and the increased limits trend. Show all work.

	<u>Average Claim Cost</u>	<u>Average Annual Change in Claim Cost from Fitted Line</u>
Total Limits	\$1,300	\$130
Basic Limits	\$900	\$75

EXAM 5, SPRING 2001, SECTION II

46. (2 points)

Marker and Muhl, "Rating Claims-Made Insurance Policies," discuss five principles of claims-made ratemaking. In each of the subparts of this question, one of these five principles is listed. For each of the stated principles, briefly describe why it is true.

a. (½ point)

A claims-made policy should always cost less than an occurrence policy, as long as claims costs are increasing.

b. (½ point)

Whenever there is a sudden, unpredictable change in underlying trend, claims-made policies priced on the basis of the prior trend will be closer to the correct price than occurrence policies priced in the same manner.

c. (½ point)

Whenever there is a sudden unexpected shift in the reporting pattern, the cost of mature claims-made coverage will be affected very little, if at all, relative to occurrence coverage.

d. (½ point)

The investment income earned from claims-made policies is substantially less than under occurrence policies.

47. (3 points)

Feldblum, "Workers' Compensation Ratemaking," describes three different types of experience periods by which insurance data is compiled.

a. (1½ points)

Describe how premiums and losses are compiled under each of the three experience periods:

- Policy Year
- Calendar Year
- Calendar/Accident Year

b. (1½ points)

State one advantage and one disadvantage associated with each type of experience period.

EXAM 5, SPRING 2001, SECTION II

48. (2 points)

Based on Feldblum, "Workers Compensation Ratemaking," and the following information, answer the questions below. Show all work.

Statewide Average Weekly Wage	\$900
Maximum Weekly Benefit	\$900
Minimum Weekly Benefit	\$360
Compensation Rate	66.7% of pre-injury wage

Wage Distribution Table		
Ratio to Average Wage	Cumulative Percentage of Workers	Cumulative Percentage of Wages
0.40	5%	2%
0.50	15%	7%
0.60	25%	13%
0.70	35%	20%
0.80	45%	28%
1.00	65%	48%
1.25	80%	67%
1.50	90%	82%
1.75	95%	90%

a. (1 point)

Calculate the average benefit as a percentage of the statewide average weekly wage.

b. (1 point)

Calculate the direct effect of changing the compensation rate from 66.7% to 80.0% of the pre-injury wage.