

CASUALTY ACTUARIAL SOCIETY

Mary Frances Miller
Vice President-Admissions

Thomas G. Myers
Chairperson
Examination Committee

Exam 6

Reserving, Insurance Accounting
Principles, and Reinsurance

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

October 30, 2001

4 HOURS

INSTRUCTIONS TO CANDIDATES

1. This 80 point examination consists of 55 questions divided into three sections. Section I contains 20 **true/false** questions worth 0.5 (one-half) point each. Section II contains 9 multiple choice questions worth 1 point each. Section III contains 26 problem and essay questions worth a total of 61 points.
2. To answer the true/false and 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 Fall 2001, and the exam number 6.

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 the true/false questions, mark "A" for "true" on the short-answer card, and mark "B" for "false" on the short-answer card. In grading the true/false questions, the point value of the question will be subtracted for each incorrect answer. No points will be added or subtracted for responses left blank.

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, 6, at the top of each answer sheet. Your name, or any other identifying mark, must not appear.

CONTINUE TO NEXT PAGE OF INSTRUCTIONS

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.

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. Also, you must clearly specify any additional assumptions you have made to answer the question.

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.

CONTINUE TO NEXT PAGE OF INSTRUCTIONS

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.
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 November 16, 2001. Please do not enclose the **survey** in the Examination Envelope.

END OF INSTRUCTIONS

EXAM 6 • FALL 2001 - SECTION I

SECTION I, QUESTIONS I-20, TRUE FALSE QUESTIONS (0.5 POINT EACH)

1. According to Bornhuetter and **Ferguson**, “The Actuary and **IBNR**,” it is not appropriate to derive the **IBNR** reserve as a function of expected losses for a new line of business.
2. “Best’s Aggregates & Averages” includes an aggregate Annual Statement Schedule P.
3. According to Marshall et al., “Accounting and Finance for Insurance Professionals,” the use of liquidation accounting is consistent with GAAP.
4. According to CAS “Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,” the five elements of a total loss reserve should be individually quantified.
5. According to Fisher and Lester, “Loss Reserve Testing in a Changing Environment,” the **expected** loss method tends to be self-correcting when loss ratios are improving and reserve adequacy is not changing.
6. According to **Linquanti**, “Calculation of Unearned Premium Reserves on Interim Audited Risks,” premiums resulting from payroll audits are fully earned when they are recorded.
7. According to Kittel, “Unallocated Loss Adjustment Expense Reserves in an Inflationary Economic Environment,” legal expenses for property insurance are paid predominantly in the first report year.
8. According to Berquist and Sherman, “Loss Reserve Adequacy Testing: A Comprehensive, Systematic Approach,” a decline in the rate of settlement of open claims will result in paid loss projections that tend to overestimate reserves.
9. According to IASA “Property • Casualty Insurance Accounting,” the surplus relief gained from an unearned premium portfolio cession remains level throughout the contract period.
10. In statutory accounting, a nonledger asset cannot be an admitted asset.
11. According to Siewert, “A Model for Reserving Workers Compensation High Deductibles,” separating claim count development from severity development is recommended when reserving for workers compensation losses excess of large deductibles.
12. According to Pinto and Gogol, “An Analysis of Excess Loss Development,” there appears to be a relationship between the layer for which business is written and the resulting development pattern.

CONTINUED ON NEXT PAGE

EXAM 6 • FALL 2001 - SECTION I

13. According to Cass et al., “Reinsurance Practices,” the Net Retained Lines Clause is attached to a property per risk excess of loss treaty to help control a reinsurer’s accumulation of risk on a single property.
14. According to Cass et al., “Reinsurance Practices,” the Sunset Clause of a casualty excess of loss treaty limits the time **after** the expiration of the treaty during which occurrences must be reported to the reinsurer.
15. According to Cass et al., “Reinsurance Practices,” the extended expiration provision provides that if the catastrophe treaty expires while a loss occurrence is in progress, the reinsurers will indemnify the ceding company as if the entire loss occurrence had occurred during the term of the treaty.
16. According to Clark, “Basics of Reinsurance Pricing,” a loss corridor is a common feature of property per risk treaties.
17. According to Clark, “Basics of Reinsurance Pricing,” the main usefulness of the payback approach in pricing property catastrophe covers is to set relativities between layers.
18. According to **NAIC**, “Reinsurance,” the surplus gain from any retroactive reinsurance may **not** be classified as Unassigned Funds until the actual liabilities have been recovered or terminated.
19. According to NAIC, “Reinsurance,” commissions receivable on reinsurance ceded business should be included as an offset to “Agents’ Balances or Uncollected Premiums.”
20. According to FASB 113, the estimated amounts receivable from reinsurers on unpaid claims must include amounts related to claims incurred but not reported.

EXAM 6 • FALL 2001 - SECTION II

SECTION II, QUESTIONS 21-29, MULTIPLE CHOICE **QUESTIONS** (1 POINT EACH)

21. You are given the following information:

Incurring loss:	\$600,000
Paid loss:	\$500,000
Incurring loss adjustment expense:	\$200,000
Paid loss adjustment expense:	\$150,000
Underwriting expenses incurred:	\$300,000
Premiums written:	\$1,200,000
Premiums earned:	\$1,000,000

Based on Marshall et al., "Accounting and Finance for Insurance Professionals," what is the trade basis combined ratio minus the financial basis combined ratio?

- A. Less than -0.03
 - B. At least -0.03, but less than -0.01
 - C. At least -0.01, but less than 0.01
 - D. At least 0.01, but less than 0.03
 - E. At least 0.03
22. According to Brosius, "Loss Development Using Credibility," the relationship between **covariance(X, Y)**, where X is the reported loss and Y is the ultimate loss, and **variance(X)** determines which of three reserving methodologies is optimal. Assuming that reported losses at the valuation date are higher than expected, match each of the three loss reserving methods on the left with the **covariance/variance** relationship on the right under which the method is optimal.

- | | |
|-------------------------------|---------------------------------------|
| 1. Budgeted loss method | a. $\text{Cov}(X, Y) = \text{Var}(X)$ |
| 2. Bomhuetter-Ferguson method | b. $\text{Cov}(X, Y) < \text{Var}(X)$ |
| 3. Link ratio method | c. $\text{Cov}(X, Y) > \text{Var}(X)$ |
- A. 1a, 2c, 3b
 - B. 1b, 2a, 3c
 - C. 1b, 2c, 3a
 - D. 1c, 2a, 3b
 - E. 1c, 2b, 3a

CONTINUED ON NEXT PAGE

23. You are given the following information concerning a book of business:

<u>State</u>	<u>Premium</u>	<u>Excess Ratio</u>
Idaho	\$50,000	0.10
Georgia	75,000	0.20
<u>Maine</u>	<u>90,000</u>	<u>0.15</u>
Total	\$215,000	

Expected loss ratio for each state 60%
 Aggregate ratio for each state 2%

Using the procedure described by Siewert, "A Model for Reserving Workers Compensation High Deductibles," what is the aggregate loss charge for this book of business?

- A. Less than \$1,500
 - B. At least \$1,500, but less than \$2,000
 - C. At least \$2,000, but less than \$2,500
 - D. At least \$2,500, but less than \$3,000
 - E. At least \$3,000
24. Which of the following is not reflected in statutory policyholders' surplus?
- A. Unassigned Funds
 - B. Special Surplus Funds
 - C. Surplus Notes
 - D. Treasury Stock
 - E. Each of the above is reflected in statutory policyholders' surplus.

EXAM 6 • FALL 2001 - SECTION II

25. Assume an insured incurred a loss of \$500,000 and had purchased a policy with a limit of **\$1,000,000**. Rank the amount of the net loss to a primary insurer under the following three types of reinsurance treaties.

1. Quota share of 50%
2. Surplus share with a minimum line of \$100,000, a maximum number of lines ceded of four, and a retention of \$100,000 from the line guide
3. Per risk excess of loss with an attachment point of \$250,000, a limit of \$750,000 excess of \$250,000, and a 10% coinsurance clause in the layer

- A . 1 < 2 < 3
B . 1 < 3 < 2
C . 2 < 1 < 3
D . 2 < 3 < 1
E . 3 < 2 < 1

26. A primary insurance company experiences a **\$40,000,000** catastrophe loss. They have a **\$90,000,000** excess of \$1 0,000,000 catastrophe reinsurance cover with one reinstatement prorata as to amount and 100% as to time. The original premium the primary insurer paid for the cover was **\$1,200,000**. What is the reinstatement premium the primary insurer would have to pay as a result of the catastrophe?

- A. Less than \$250,000
B. At least \$250,000, but less than \$350,000
C. At least \$350,000, but less than \$450,000
D. At least \$450,000, but less than \$550,000
E. At least \$550,000

CONTINUED ON NEXT PAGE

EXAM 6 - FALL 2001 - SECTION II

27. Which of the following best matches the types of reinsurance to the **functions** of reinsurance?

- A. Large Line Capacity: Per occurrence excess
Premium Capacity: Catastrophe excess
Loss Ratio Stability: Quota share
- B. Large Line Capacity: Clash Cover
Premium Capacity: Quota share
Loss Ratio Stability: Surplus share
- C. Large Line Capacity: Catastrophe excess
Premium Capacity: Quota share
Loss Ratio Stability: Aggregate excess
- D. Large Line Capacity: Per occurrence excess
Premium Capacity: Quota share
Loss Ratio Stability: Aggregate excess
- E. Large Line Capacity: Per occurrence excess
Premium Capacity: Aggregate excess
Loss Ratio Stability: Surplus share

28. Your insurance company currently purchases catastrophe **reinsurance to cover the one-in-100-year catastrophe event**. The corporate risk advisor has decided **to purchase an additional layer of reinsurance to withstand the one-in-250-year catastrophe event**. ABC Re, the company's reinsurer, has offered to provide this additional layer of coverage using a **100-year payback** approach.

<u>Percentile</u>	Probable Maximum <u>Loss</u>
99.90	\$200,000,000
99.80	150,000,000
99.60	125,000,000
99.50	100,000,000
99.00	80,000,000
98.00	60,000,000

According to Cass et al., "Reinsurance Practices," and based upon the table above, what is the additional premium that would be ceded to ABC Re?

- A. Less than \$300,000
 - B. At least \$300,000, but less than \$600,000
 - C. At least \$600,000, but less than \$900,000
 - D. At least \$900,000, but less than \$1,200,000
 - E. At least \$1,200,000
29. According to Clark, "Basics of Reinsurance Pricing," which of the following is true?
- A. When including ALAE in a treaty, the pro-rata method always produces a lower amount reinsured than the add-on method.
 - B. A multiple year feature is a common characteristic of finite risk covers,
 - C. Loss development statistics produced by the Reinsurance Association of America have stable groupings of data by attachment point and limit.
 - D. "Free cover" refers to exposure rating a layer that attaches higher than the largest policy limit sold by a ceding company.
 - E. A loss corridor is a contract provision that provides for the reinsurer's loss experience to be capped so that it remains above a minimum and below a maximum.

EXAM 6 • FALL 2001 - SECTION III

SECTION III, QUESTIONS 30-55, **WRITTEN ANSWER** QUESTIONS

30. (3 points)

You are given the following information:

- A \$250,000 cap on non-economic damages in medical malpractice suits was eliminated effective with January 1, **2000** and subsequent occurrences.
- Expected accident year 2000 losses if cap was still in effect: \$25 million.
- Expected increase in accident year 2000 losses from cap elimination is 40%.
- Expected percentage of accident year losses reported at 12 months before cap elimination is 40%.
- Expected percentage of accident year losses reported at 12 months **after** cap elimination is 30%.
- Estimated standard deviation of ultimate losses is \$10 million after the elimination of the cap.
- Estimated standard deviation of the ratio of reported loss to ultimate loss at 12 months of development is 0.20 after the elimination of the cap.
- Reported accident year 2000 losses at 12 months of development is \$15 million.
- There is no loss development beyond 48 months.

Calculate the ultimate loss estimate for accident year 2000 using the Bayesian credibility method as discussed in Brosius, "Loss Development Using Credibility." Show all work.

CONTINUED ON NEXT PAGE

EXAM 6 • FALL 2001 - SECTION III

31. (3 points)

You are given the following information:

Calendar <u>Year</u>	Calendar Year <u>Paid ULAE</u>
1998	\$19,000
1999	47,250
2000	93,933

Claims Closed in Calendar Year Number of Accident Year 1998 – 2000 Claims Closed By Report Year*

<u>Year</u>	<u>Report Year</u>				
	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>
1998	5				
1999	10	10			
2000	15	20	18		
2001	20	30	35	10	
2002		40	53	19	5
2003			71	29	9
2004				39	14
2005					18
Total Reported	50	100	177	97	46

* Values after Calendar Year 2000 are projections

Assuming the insurer began writing business on January 1, 1998, calculate the outstanding ULAE at December 31, 2000 using the method outlined in Johnson, “Determination of Outstanding Liabilities for Unallocated Loss Adjustment Expenses.” Show all work.

CONTINUED ON NEXT PAGE

EXAM 6 - FALL 2001 - SECTION III

32. (4 points)

You are given the following information as of December 31, 2000:

Report Year	Case Reserve By Report Year			
	Age of Development (Months)			
<u>12</u>	24	36	<u>48</u>	
1997	200	150	75	25
1998	300	250	150	
1999	350	275		
2000	400			

Report Year	Incremental Paid Loss			
	Age of Development (Months)			
<u>12</u>	<u>24</u>	<u>36</u>	<u>48</u>	
1997	100	75	70	50
1998	125	80	100	
1999	175	110		
2000	225			

Assume all claims are closed by 60 months and that the 48 month-to-ultimate paid on reserve factor is 1.25.

Based on the reserve development method from Wisner, "Loss Reserves," calculate the ultimate loss for report years 1997 through 2000. Show all work.

CONTINUED ON NEXT PAGE

EXAM 6 - FALL 2001 - SECTION III

33. (2 points)

You are given the following information:

Accident <u>Year</u>	Estimated Ultimate <u>Claim Count</u>	<u>Cumulative Loss Payments</u>		
		<u>Age of Development (Months)</u>		
		<u>12</u>	24	36
1998	1,000	300,000	930,000	1,490,000
1999	1,200	396,000	1,189,800	
2000	1,300	471,900		

<u>Age of Accident Year</u>	<u>“Proportion Closed” Ratios For Claims</u>
12 Months	30%
24 Months	60%
36 Months	100%

Using the approach described in Adler and Kline, “Evaluating Bodily Injury Liabilities Using a Claims Closure Model,” calculate the cumulative loss payments for accident year 2000 at 24 and 36 months of development. Assume 5% future annual inflation and no partial payments. Show all work.

CONTINUED ON NEXT PAGE

EXAM 6 • FALL 2001 • SECTION III

34. (4 points)

You are given the following information:

- Incurred losses for the base accident month (month 0) under a constant severity assumption are \$5,000.
- Monthly rate of change in severity is 0.3%.
- Monthly rate of change in frequency is 0.2%.
- Average time lag between claim occurrence and claim report is 1 month.
- The percentage of unpaid losses at the beginning of the month that are paid during the month is 25%.

Using the method described by **McClenahan** in “A Mathematical Model for Loss Reserve Analysis,”

- a. (2 points) Calculate the losses incurred in month 2 that remain unpaid at the end of month 5. Show all work.
- b. (2 points) Calculate the percentage of unpaid loss from part a. that will be paid by the end of month 7. Show all work.

35. (2 points)

You are given the following information:

Earned <u>Exposures</u>	Accident <u>Year</u>	<u>Cumulative Paid Losses (\$000's)</u>				
		<u>Age of Development (Months)</u>				
		<u>12</u>	24	36	48	<u>60</u>
100,000	1996	200	240	250	250	250
100,000	1997	165	235	245	245	
100,000	1998	205	245	255		
100,000	1999	195	235			
100,000	2000	203				

- a. (1 point) Describe an unusual pattern in the data and a potential cause for this pattern.
- b. (1 point) Using the triangular method described by Wiser in “Loss Reserving” and considering the unusual pattern identified in part a., estimate the required reserves as of December 31, 2000. Show all work and explain how you address the unusual data pattern.

CONTINUED ON NEXT PAGE

EXAM 6 - FALL 2001 - SECTION III

36. (3 points)

You are given the following information:

Average Claim Costs for Claims Settled During Interval

Age Range (Months)	Report Year			
	1997	1998	1999	2000
0-12	500	520	541	563
13-24	1,000	1,050	1,103	
25-36	1,200	1,272		
37-Ultimate	1,450			

Percentage of Total Incurred Claims Settled in Interval

Age Range (Months)	Report Year			
	1997	1998	1999	2000
0-12	0.475	0.480	0.490	0.485
13-24	0.350	0.375	0.370	
25-36	0.100	0.090		
37-Ultimate	0.075			

Age Range (Months)	Average % Increase in Claim Cost
0-12	4%
13-24	5%
25-36	6%
37-Ultimate	7%

Carried reserve for report year 2000 = \$528,359

Number of incurred claims for report year 2000 = 570

Using the method described by Fisher and Lange, "Loss Reserve Testing: A Report Year Approach," calculate the reserve equity position for report year 2000 and indicate whether it is adequate or deficient. Show all work.

CONTINUED ON NEXT PAGE

37. (2 points)

You have been retained by ABC Insurance Company to create a Dynamic Financial model of their operations. ABC has significant property catastrophe exposure.

Based on **Warthen** and **Sommer**, “Dynamic Financial Modeling – Issues and Approaches,”

- a. (1 point) List two approaches to modeling ABC’s property catastrophe risk.
- b. (1 point) For each of the approaches listed in part a. above, describe a practical consideration for implementation.

38. (1.5 points)

You are given the following information relating to calendar year 2000:

	Accident Year	
	<u>2000</u>	<u>1999 and Prior</u>
Earned premium	\$100,000	\$0
Investment income generated from unearned premium	3,000	0
Investment income generated from loss and LAE reserves	2,000	10,000
Incurred underwriting expenses	30,000	5,000
Loss and LAE payments	7,000	30,000
Loss and LAE reserves as of December 31, 1999	N/A	200,000
Loss and LAE reserves as of December 31, 2000	60,000	165,000

Based on **Khury**, “Loss Reserves: Performance Standards,” calculate the actuarial gain/loss realized during calendar year 2000. Show all work.

EXAM 6 • FALL 2001 - SECTION III

39. (2.5 points)

You are given the following information:

<u>Retro Adjustment Periods</u>	<u>Selected Premium Development to Loss Ratios</u>	<u>Incremental Percentage of Loss Emerged</u>
First	1.600	75%
Second	0.500	15%
Third	0.300	7%
Fourth	0.100	2%
Subsequent	0.000	1%

Expected Loss Ratio = 0.700

Loss Conversion Factor = 1.100

Tax Multiplier = 1.025

Based on Teng and Perkins, "Estimating the Premium Asset on Retrospectively Rated Policies,"

- (1 .5 points) Calculate the cumulative premium development to loss development factors for each retro adjustment period. Show all work.
- (1 point) Why do the ratios of premium development to loss development follow the pattern exhibited in the table above?

40. (2 points)

In Morrell's discussion of Berry, "A Method for Setting Retro Reserves," he suggests that, in most situations, a simpler and equally effective formula for DR2 can be used in place of that suggested by Berry.

- (1 point) For those insurers that use Berry's DR2 formula, on what two conditions do the loss projections rely?
- (0.5 point) What simplification does Morell suggest?
- (0.5 point) What condition must be met in order for this simplification to be considered?

CONTINUED ON NEXT PAGE

EXAM 6 - FALL 2001 - SECTION III

4 1. (2 points)

You are given the following information for XYZ Insurance Company's **OL&T** BI line of business:

Development	Excess Reported Loss Development Factors For Retention of:			Excess of \$25,000 Ratio of Paid to Reported Excess Loss	
	<u>Months</u>	<u>\$25.000</u>	<u>\$100.000</u>	<u>Months</u>	<u>Ratio</u>
27-39	1.035	1.045	1.055	27	0.200
39-51	1.031	1.041	1.051	39	0.300
51-63	1.027	1.037	1.047	51	0.400
63-75	1.023	1.033	1.043	63	0.550
75-87	1.016	1.026	1.036	75	0.650
87-99	1.009	1.019	1.029	87	0.750
99-Ultimate	1.015	1.025	1.035	99	0.850

Using the method described by Pinto and Gogol in "An Analysis of Excess Loss Development," estimate the 27 month-to-ultimate paid loss development factor for **OL&T** BI losses in excess of \$100,000. Show all work.

CONTINUED ON NEXT PAGE

EXAM 6 • FALL 2001 - SECTION III

42. (3 points)

You are given the following information:

Accident <u>Year</u>	Cumulative Incurred Losses			
	Age of Development (Months)			
	<u>12</u>	24	36	48
1997	11,000	12,000	13,000	15,000
1998	15,000	16,000	18,000	
1999	17,000	19,000		
2000	20,000			

Accident <u>Year</u>	Cumulative Paid Losses			
	Age of Development (Months)			
	<u>12</u>	24	36	48
1997	5,000	7,000	11,000	15,000
1998	7,000	9,000	13,000	
1999	8,000	11,000		
2000	10,000			

Accident <u>Year</u>	Cumulative Paid ALAE			
	Age of Development (Months)			
	<u>12</u>	24	36	48
1997	250	525	1,650	3,000
1998	350	675	1,950	
1999	400	825		
2000	500			

Assume that all claims are settled at 48 months.

Calculate the ALAE reserve (excluding IBNR) using the F-Ratio method described in Resony, "Allocated Loss Expense Reserves." Show all work.

EXAM 6 • FALL 2001 - SECTION III

43. (2 points)

- a. (1 point) Based on Marshall et al., “Accounting and Finance for **Insurance Professionals**” state two criteria that valuation rules under statutory accounting principles are designed to satisfy.
- b. (1 point) Give one example for each criterion in part a.

44. (1 point)

Briefly explain what is meant by the statutory accounting phrase “equity in the unearned premium reserve.”

45. (2.5 points)

In determining the unearned premium reserve for qualifying long-term contracts, the NAIC rules require three amounts or “tests” to be calculated for each policy year.

- a. (1 point) What are the two conditions of warranty or service contracts that would require the application of the **NAIC’s** three “tests” in determining the unearned premium reserve for these contracts?
- b. (1.5 points) According to Hayne “Unearned Premium Reserve – Change is in the Wind,” each test seems to take a different view of the purpose of the unearned premium reserve. Briefly describe each of the three views.

CONTINUED ON NEXT PAGE

EXAM 6 - FALL 2001 - SECTION III

46. (2 points)

You are given the following insurance company data:

Written Premium	\$45,000
Beginning Unearned Premium Reserve	20,000
Ending Unearned Premium Reserve	22,000
Underwriting Expense Incurred	12,000
Paid Loss and LAE	30,000
Beginning Loss and LAE Reserve	40,000
Ending Loss and LAE Reserve	44,000
Interest Income	3,000
Dividend Income	1,000
Realized Capital Gains	1,500
Unrealized Capital Gains	2,000
Policyholder Dividends	500
Stockholder Dividends	750

Calculate the statutory net income before federal income tax. Show all work.

CONTINUED ON NEXT PAGE

EXAM 6 - FALL 2001 - SECTION III

47. (2 points)

A primary insurance company is considering forming an admitted professional reinsurer instead of maintaining an assumed reinsurance department. According to Elliot et al., "Principles of Reinsurance," identify two advantages and two disadvantages of establishing an admitted professional reinsurer.

48. (2 points)

You are given the following information **from** a prospective reinsurance client:

Policy <u>Limit</u>	Manual Direct <u>Premium</u>	Increased Limits <u>Factor</u>
\$100,000	\$5,000,000	1.000
500,000	3,000,000	1.260
<u>1,000,000</u>	<u>2,000,000</u>	1.400
Total	\$10,000,000	

	Primary Insurer's <u>Direct Expenses</u>
Agents Commission	17.5%
Overhead Expense	12.5%
Boards, Bureaus, Taxes	5.0%
Underwriting Profit	5.0%

Reinsurance Loading for ALAE = 1.10

Reinsurance Loading for Brokerage, Internal Expense, and Underwriting Profit = 1.25

Based on Cass et al., "Reinsurance Practices," calculate the exposure rate for a \$500,000 excess of \$500,000 reinsurance cover. Show all work.

CONTINUED ON NEXT PAGE

49. (1.5 points)

Based on Cass et al., "Reinsurance Practices," briefly describe the following bases of attachment for reinsurance treaties.

- a. (0.5 point) Policies-attaching basis
- b. (0.5 point) Losses-occurring basis
- c. (0.5 point) Policies-issued basis

50. (1 point)

According to Cass et al., "Reinsurance Practices," what are two reasons that experience rating is not used in pricing catastrophe treaties?

51. (2.5 points)

You are given the following information:

A primary insurance company buys a quota share treaty **from** a reinsurer with a sliding scale commission structure with the following terms:

Provisional Commission	27.5%	
Minimum Commission	25.0%	at 66% loss ratio
Sliding 0.750:1 to	28.0%	at 62% loss ratio
Sliding 0.667: 1 to a maximum	32.0%	at 56% loss ratio

The reinsurer's operating expenses are 4% of ceded premium.

The primary insurer's expenses are 15% for brokerage, 3.5% for taxes, and 9% for operating expenses.

Using the concepts presented in Clark, "Basics of Reinsurance Pricing," answer the following. Show all work.

- a. (1 point) Calculate the technical ratios for the treaty if its ultimate loss ratios are:
- i. 52.0%
 - ii. 57.0%
- b. (0.5 point) What loss ratio produces a 100% combined ratio for the reinsurer?
- c. (0.5 point) What is a "balanced" plan?
- d. (0.5 point) What is the correct method to interpret the potential profitability of a sliding scale reinsurance agreement from the reinsurer's perspective?

52. (3 points)

You are given the following information:

Cumulative Distribution of Losses By Cause		
Class: <u>Retail/Wholesale</u>		
<u>Loss as a % of Insured Value</u>	<u>Cause of Loss</u>	
	<u>Fire</u>	<u>All Other</u>
25%	75%	80%
50%	95%	96%
75%	98%	98%
100%	100%	100%

Premium By Policy Limit		
<u>Policy Limit</u>	<u>Retail/Wholesale</u>	<u>All Other Classes</u>
\$50,000	\$50,000	\$50,000
100,000	50,000	100,000
<u>200,000</u>	<u>50,000</u>	<u>150,000</u>
Total	\$ 1 50,000	\$300,000

<u>Cause of Loss</u>	<u>Loss Weights</u>
Fire	40%
All Other	60%

- Expected Loss Ratio = 65%
- **ALAE** as a percent of loss = 10%
- Ceding Company Rate Adequacy = 5% Inadequate
- Reinsurer Expense Load = 1.25
- Weighted Average Exposure Rate for All Classes excluding Retail/Wholesale = 0.0444

Using Ludwig's approach in "An Exposure Rating Approach to Pricing Property Excess-of-Loss Reinsurance," calculate the total commercial property exposure rate for the layer \$100,000 excess of \$100,000. Show all work.

EXAM 6 • FALL 2001 - SECTION III

53. (3 points)

You are given the following information on ceded reinsurance as of December 31, 2000:

Accident <u>Year</u>	Ceded Unadjusted Earned <u>Premium</u>	Ceded Adjusted * Earned <u>Premium</u>	Ceded Incurred Losses at December 31, <u>2000</u>
1998	\$23,438	\$25,781	\$16,500
1999	25,568	28,125	9,000
2000	27,699	30,469	3,900

<u>Age (months)</u>	Percent Reported
12	16.0%
24	40.0%
36	80.0%
48	100.0%

* Premium is adjusted for rate level differences by year.

Using the methodology outlined by Patrik, "Reinsurance," calculate the ceded **IBNR** as of December 31, 2000 using the Stanard-Buhlmann technique. Show all work.

54. (2 points)

According to Patrik, "Reinsurance," list one advantage and one disadvantage for each of the following reserving techniques:

- a. (1 point) Standard American Chainladder
- b. (1 point) Bomhuetter-Ferguson

CONTINUED ON NEXT PAGE

EXAM 6 - FALL 2001 - SECTION III

55. (2.5 points)

You are given the following information:

Future wage loss benefits:	\$20,000 per year
Life expectancy:	15 years
Present value of expected future wage loss benefits:	\$207,500
Current year-end wage loss case reserve:	\$300,000
IRS discount factor applicable to this case reserve:	0.80
Present value of unwind of IRS discount:	\$42,000
Tax rate:	35%
Applicable Reinsurance:	None

A workers compensation insurer is considering settling the wage loss portion of a permanent disability injury with a claimant by paying a lump sum amount. Based on Steeneck, "Commutation of Claims,"

- a. (2 points) What is the ambivalence commutation price? Show all work.
- b. (0.5 point) List two items that should be considered in order to establish a range about the estimate calculated in part a.

END OF EXAMINATION

Fall 2001 Exam 6 Multiple Choice Answers

- 1F
- 2T
- 3F
- 4F
- 5F
- 6T
- 7T
- 8F
- 9F
- 10F
- 11T
- 12T
- 13F
- 14T
- 15T
- 16F
- 17T
- 18T
- 19F
- 20T
- 21A
- 22B
- 23C
- 24D or E
- 25B
- 26C
- 27D
- 28B
- 29B