INSTRUCTIONS TO CANDIDATES

1. This 100 point examination consists of 50 questions divided into two sections. Section I contains 10 multiple choice questions worth one point each. Section II contains 40 problem and essay questions worth a total of 90 points.

2. To answer the multiple choice questions, use the short-answer card provided and a number 2 or HB pencil only. 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 2006, and the exam number 5.

   Darken the spaces corresponding to your Candidate ID number. Four rows are available. If your Candidate ID number is fewer than 4 digits, include leading zeros. (For example, if your Candidate ID number is 987, consider that your Candidate ID number is 0987, enter a zero on the first row, 9 on the second row, 8 on the third row, and 7 on the fourth [last] row.) Please write 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. Do not use multiple colors.

   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

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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. Prior to the start of the exam you will have a fifteen-minute reading period in which you can silently read the questions and check the exam booklet for missing or defective pages. Writing will NOT be permitted during this time and you will not be permitted to hold pens or pencils. The supervisor has additional exams for those candidates who have defective exam booklets.

5. Do all problems until you reach the last page of the examination where "END OF EXAMINATION" is marked.

6. 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.

7. Verify that you have received the reference materials:

8. 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.

9. 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.

CONTINUE TO NEXT PAGE OF INSTRUCTIONS
10. 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.

11. 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.

12. The exam survey is available on the CAS website in the “Admissions” section. Please submit your survey by May 15, 2006.

END OF INSTRUCTIONS
SECTION 1, QUESTIONS 1 – 10, MULTIPLE CHOICE QUESTIONS (1 POINT EACH)

1. Damage from which of the following is covered under "Damage to Your Auto" in the ISO Personal Automobile Policy (PAP)? Ignore any theft-related exceptions.

   A. Freezing
   B. Wear and Tear
   C. Flood
   D. Mechanical Breakdown
   E. Road Damage to Tires

2. Which of the following are true about the liability insurer's duty to defend policyholders against suit under an ISO Commercial General Liability policy?

   1. The insurer has a duty to defend the insured against any suit to which the insurance applies that is seeking damages for bodily injury.
   2. Defense costs are payable in addition to the limits of insurance.
   3. The insurer's duty to defend ends when the applicable limit of insurance has been exhausted.

   A. 1 only
   B. 2 only
   C. 3 only
   D. 2 and 3 only
   E. 1, 2, and 3
3. According to the ISO Personal Automobile Manual, which of the following mid-term changes to an annual policy can result in a mid-term premium adjustment?

   A. The use of a vehicle on the policy is changed from “Business Use” to “Pleasure Use.”
   B. An operator on the policy attains a certain age that results in a Classification change.
   C. An operator is involved in an accident that results in a change in the Driving Record Sub-Classification.
   D. A review of loss experience results in a change in symbol assignment of a vehicle that is on the current policy.
   E. An operator on the policy now qualifies for the Good Student Classification.

4. According to Webb et al, in *Insurance Operations and Regulation*, which of the following activities are more commonly performed by staff underwriters rather than by line underwriters?

   1. Conducting underwriting audits
   2. Determining proper coverage
   3. Researching and developing coverages and policy forms

   A. 2 only
   B. 3 only
   C. 1 and 2 only
   D. 1 and 3 only
   E. 1, 2, and 3

5. Which of the following is not necessary to determine the trending period for premium?

   A. Anticipated effective date of prospective rate change
   B. Term of the policies contributing to the experience and forecast periods
   C. Historical rate changes and effective dates
   D. Expected time that the projected rates will be in effect
   E. Length of historical experience period
6. When making rates for a line of business where premiums are subject to audit adjustments, which premium may be used?
   1. Policy year earned premium
   2. Calendar year earned premium
   3. Exposure year earned premium

   A. 1 only
   B. 2 only
   C. 3 only
   D. 1 and 3 only
   E. 2 and 3 only

7. Which of the following are true of the indirect effect of an increase to statutory benefit levels for Workers' Compensation?
   1. Lower-income employees are affected more than higher-income employees.
   2. The frequency of permanent total disability claims is affected more than the frequency of temporary total claims.
   3. The duration of disability for primary wage earners is impacted more than that for secondary wage earners.

   A. 1 only
   B. 2 only
   C. 1 and 3 only
   D. 2 and 3 only
   E. 1, 2, and 3
8. Which of the following changes might cause an insurer to develop a more refined classification plan?

1. The market becomes more competitive.
2. Coverage becomes more expensive.
3. The market becomes larger.

A. 1 only  
B. 2 only  
C. 1 and 3 only  
D. 2 and 3 only  
E. 1, 2, and 3

9. Which of the following are true about increased limits ratemaking?

1. Loss development factors for increased limits coverage increase for each successively higher layer of coverage.
2. In a period of declining claims costs, the annual rate of change in increased limits losses is less than the annual rate of change in basic limits losses.
3. For limits above $1 million, risk is a more important element in the pricing of excess coverage than the pure premium.

A. 1 only  
B. 2 only  
C. 1 and 3 only  
D. 2 and 3 only  
E. 1, 2, and 3
10. John's Car Wash is a new single-location business. It is purchasing commercial general liability insurance. Which of the following rating methods might be used in calculating the premium?

1. Schedule Rating
2. Experience Rating
3. Composite Rating

A. 1 only
B. 2 only
C. 3 only
D. 1 and 2 only
E. 1 and 3 only
11. (1.5 points)

Other than private insurance, identify and briefly describe three methods used by employers to provide the benefits required by statutory Workers’ Compensation laws?

12. (2.25 points)

Identify and describe three common types of suits or claims that are covered by an employer’s liability insurance policy.

13. (2.25 points)

Based on Malecki and Flitner in *Commercial Liability Insurance and Risk Management*, answer the following questions.

a. (0.5 point)

Briefly describe the concept of strict liability in tort.

b. (0.75 point)

In a products liability action alleging strict liability in tort, what three elements must the plaintiff prove?

c. (1 point)

Besides strict liability, identify and describe two other broad types of torts recognized by law.
14. (2 points)
   a. (1 point)
      State four purposes of exclusions in insurance contracts.
   b. (1 point)
      For each stated purpose in part a. above, cite an example of a loss exposure that is excluded for that purpose.

15. (3.5 points)
   Bob gave David permission to use his car. While driving this car, David hit Jeff's car. David was legally liable for the accident resulting in injuries to Jeff and two other passengers in Jeff's car. The court awarded $120,000 in bodily injury to Jeff and $100,000 and $80,000 to the two other passengers, respectively. Also, 10% of each bodily injury amount was added for prejudgment interest. The damage to Jeff's car amounted to $15,000. The damage to Bob's car amounted to $10,000.

   - Bob has a Personal Automobile Policy (PAP) with $100,000/$300,000/$50,000 liability limits and a $250 collision deductible.
   - David has a PAP with $25,000/$50,000/$25,000 liability limits and a $100 collision deductible.
   - Jeff has a PAP with $300,000 single liability limit and no collision coverage.

   a. (1.5 points)
      According to the ISO PAP, how much will Bob's PAP pay for the at-fault accident incurred by David? Show all work.

   b. (1.5 points)
      According to the ISO PAP, how much will not be covered by either Bob's PAP or David's PAP for the at-fault accident incurred by David? Show all work.

   c. (0.5 point)
      Assuming Bob's car was purchased one week ago, and he hadn't yet notified his current insurer of this new car before the accident, would this change your answers to parts a. and b. above? Explain.
EXAM 5, SPRING 2006, SECTION II

16. (1.5 points)

An insured has purchased the following two insurance policies with the same insurance company:

Policy A: A Commercial General Liability (CGL) policy with a per occurrence limit of $1,000,000 and a general aggregate limit of $2,000,000.
Policy B: An Umbrella Liability policy with a per occurrence limit of $5,000,000 and a self-insured retention of $25,000.
Both policies are annual-term policies effective July 1, 2005.

The following claim, which is covered by both the CGL and Umbrella policies, is incurred on September 1, 2005:

- Bodily Injury damages awarded at trial: $2,000,000
- Pre-judgment interest: $50,000
- Defense costs: $300,000

Determine how much is paid by the insured, the CGL policy, and the Umbrella Liability policy for this claim. Show all work.

17. (1 point)

Consider an insured property loss of $50,000 on a structure worth $200,000. The property is covered by a Building and Personal Property (BPP) coverage form with a limit of insurance of $150,000 and a $1,000 deductible. Calculate the amount of the claim covered by the BPP policy. Show all work.

18. (1.5 points)

Webb et al, in Insurance Operations and Regulation, discuss five types of liabilities that may be covered under an insurance contract. Besides Tort Liability, identify and describe three other types of liabilities.
19. (1.5 points)

Briefly describe the following techniques used by insurers in the settlement of claims, and why they are used:

a. (0.5 point)
Structured settlements

b. (0.5 point)
Advance payments

c. (0.5 point)
Walk-away settlements

20. (2 points)

Company ABC and its competitors write only large Workers' Compensation risks. All of ABC's insureds have extensive loss experience. When calculating the premium for their insureds, ABC does not utilize experience rating; however, all of its competitors incorporate experience rating into their premium calculation. Assuming manual rates for all insurers are the same, explain whether the loss ratios for ABC would be expected to be higher than, lower than, or the same as its competitors.
21. (1 point)

Company AAA and Company BBB each provides 15% commissions to their agents for new business policies. Company AAA uses an independent agency system while Company BBB uses an exclusive agency system.

a. (0.5 point)

Which company would be more likely to have lower renewal business commissions? Explain.

b. (0.5 point)

According to Webb et al., is having a lower renewal business commission more important for Personal Lines consumers or Commercial Lines consumers? Explain.

22. (2.5 points)

a. (1.5 points)

Briefly describe the insurance business cycle starting at the beginning of the hard market, giving particular attention to the level of prices and supply of insurance.

b. (1 point)

Explain how companies can impact the cycle through their decisions on where to set reserve levels.
23. (2 points)

Managed care plans that differ substantially from traditional group health insurance plans have been developed by insurers and employers.

a. (0.5 point)

Managed care plans offer a number of advantages to insurers, employers and employees. Describe two of these advantages.

b. (0.5 point)

Describe one major criticism of managed care plans from a patient’s perspective and one major criticism from an HMO network physician’s perspective.

c. (0.5 point)

A health maintenance organization (HMO) is an example of a managed care plan. List two common characteristics of an HMO.

d. (0.5 point)

Describe a preferred provider organization (PPO) and explain how it is different from an exclusive provider organization (EPO).

24. (2 points)

Total payroll is commonly used as an exposure base for Workers’ Compensation insurance. For each of the following coverages, briefly explain why total payroll may not be the best exposure base. Suggest an alternative exposure base for each coverage and explain why it would be an improvement over total payroll.

a. (1 point)

Workers’ Compensation Medical Benefits Coverage

b. (1 point)

Workers’ Compensation Indemnity Benefits Coverage
EXAM 5, SPRING 2006, SECTION II

25. (1.5 points)

The ratemaking actuary for ABC Insurance Company is proposing to change the exposure base for Homeowners Insurance from number of homes to amount of Coverage A.

a. (0.5 point)

According to the *Statement of Principles regarding P&C Insurance Ratemaking*, state two desirable characteristics of an exposure base.

b. (1.0 point)

Determine which exposure base better satisfies each of the characteristics stated in part a. above. Explain.

26. (3.5 points)

As the actuary for Company XYZ, you are performing a physical damage rate review for State X. Use the following information to answer the questions below.

- Experience period consists of calendar year premium for 2002 through 2004.
- Current level earned premium for calendar year 2002 is $42,500,000.
- Planned effective date of rate revision is June 1, 2006.
- Anticipate annual rate revisions every 12 months.

Each year, insureds purchase newer, more expensive vehicles, resulting in upward premium drift. Historically, the premium drift has averaged 5% through 2004. However, given current trends and expectations regarding future car sales, the insurer expects a 3% premium drift in the future. The insurer uses exponential premium trend.

a. (1.5 points)

Assume all policies have a six-month term. Use 2-step trending with average written premium to calculate the trended premium for calendar year 2002. Show all work.

b. (1.5 points)

Assume all policies have an annual term. Use 2-step trending with average written premium to calculate the trended premium for calendar year 2002. Show all work.

c. (0.5 point)

Explain one advantage of using 2-step trending in this example over 1-step trending.
27. (1 point)
   a. (0.5 point)
      Explain why using average premiums is better than total premiums when analyzing premium trend.
   b. (0.5 point)
      Give one argument for using average earned premiums in the premium trend analysis and one argument for using average written premiums.

28. (3 points)
   Company XYZ reduced rates 8% effective May 1, 2004, which was their first rate change since January 1, 2000. Assume all policies have annual terms.
   a. (1 point)
      Using the parallelogram method, calculate the 2005 on-level factor. Show all work.
   b. (0.5 point)
      Assume that this change was for a boatowners line and that 50% of the policies are written uniformly throughout May and June, with the other 50% written uniformly throughout the rest of the year. Is the calculation above reasonable for this line? Explain.
   c. (1.5 points)
      Based on the assumptions given in part b. above, calculate the 2005 on-level factor. Show all work.
29.  (3 points)

   a.  (1.25 points)

   Using the countrywide loss data below, calculate the expected ultimate losses for policy
   year 2003. Assume losses develop by an additional 5% beyond 75 months. Show all
   work.

<table>
<thead>
<tr>
<th>Policy Year</th>
<th>27 Months</th>
<th>39 Months</th>
<th>51 Months</th>
<th>63 Months</th>
<th>75 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td></td>
<td></td>
<td></td>
<td>$7,320</td>
<td>$7,906</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td>$6,921</td>
<td>7,613</td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td>$7,424</td>
<td>8,908</td>
<td>10,156</td>
<td>10,917</td>
</tr>
<tr>
<td>2002</td>
<td>$4,733</td>
<td>6,266</td>
<td>7,225</td>
<td>8,091</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>4,969</td>
<td>6,361</td>
<td>7,505</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>3,926</td>
<td>5,261</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>5,044</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   b.  (0.5 point)

   Using the method discussed by Graves and Castillo, how would you select the 75 month
   to ultimate factor using the results from part a. above? State the assumption underlying
   this method.

   c.  (1.25 points)

   Using the loss data for State X shown below, and the results from part a. above, calculate
   the credibility weighted 63-75 link ratio for State X, using the method discussed by
   Graves and Castillo. Assume the K constant is 1,250. Show all work.

<table>
<thead>
<tr>
<th>Policy Year</th>
<th>63 months</th>
<th>75 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>$366</td>
<td>$403</td>
</tr>
<tr>
<td>2000</td>
<td>381</td>
<td>434</td>
</tr>
<tr>
<td>2001</td>
<td>503</td>
<td>563</td>
</tr>
<tr>
<td>2002</td>
<td>405</td>
<td></td>
</tr>
</tbody>
</table>

   CONTINUED ON NEXT PAGE
30. (3.5 points)

Given the following historical policy experience and assumptions, calculate the indicated rate for a 1st year Claims-Made Policy for 2003. Show all work.

<table>
<thead>
<tr>
<th>Policy Group</th>
<th>Effective Date</th>
<th>Claims-Made Policy</th>
<th>Number of Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>January 1, 2002</td>
<td>1st Year</td>
<td>1,000</td>
</tr>
<tr>
<td>2</td>
<td>April 1, 2002</td>
<td>2nd Year</td>
<td>500</td>
</tr>
</tbody>
</table>

- Accident Year 2002, Report Year 2002 losses = $4,406,250
- Variable Expense Ratio = 15%
- Profit Provision = 5%
- Fixed Expenses = $100
- Annual Inflation = 10%

31. (3.25 points)

a. (2 points)

Given the following claim information for accident year 2005, calculate the annual inflation rate for claims in the layer $50,000 excess of $100,000 for 2006. Assume a ground-up annual claims inflation rate of 10%. Show all work.

<table>
<thead>
<tr>
<th>Claim</th>
<th>Ground-up Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$75,000</td>
</tr>
<tr>
<td>2</td>
<td>100,000</td>
</tr>
<tr>
<td>3</td>
<td>125,000</td>
</tr>
<tr>
<td>4</td>
<td>150,000</td>
</tr>
</tbody>
</table>

b. (1.25 points)

How would you expect the inflation rate in the layer $50,000 excess of $100,000 to differ from the inflation rate for claims limited to $100,000? Explain two reasons for the difference between the inflation rates.
32. (2 points)

a. (1.5 points)

For both premium and loss data, describe the following methods for grouping ratemaking experience:

- Policy Year
- Calendar Year
- Accident Year

b. (0.5 point)

For purposes of ratemaking, which method in part a. above is most responsive and which method is least responsive?
33. (3 points)

Given the following private passenger automobile ratemaking data for the past three calendar years, answer the following questions.

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Premium</td>
<td>$20,000,000</td>
<td>$25,000,000</td>
<td>$30,000,000</td>
</tr>
<tr>
<td>Earned Premium</td>
<td>19,000,000</td>
<td>24,000,000</td>
<td>28,000,000</td>
</tr>
<tr>
<td>Commissions</td>
<td>3,000,000</td>
<td>3,750,000</td>
<td>3,000,000</td>
</tr>
<tr>
<td>General Expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Office Salaries</td>
<td>798,000</td>
<td>1,056,000</td>
<td>1,008,000</td>
</tr>
<tr>
<td>Home Office Utilities</td>
<td>209,000</td>
<td>216,000</td>
<td>280,000</td>
</tr>
<tr>
<td>One-Time Expense associated with Reduction in Staff</td>
<td>0</td>
<td>360,000</td>
<td>0</td>
</tr>
<tr>
<td>All Other General Expenses</td>
<td>190,000</td>
<td>240,000</td>
<td>280,000</td>
</tr>
<tr>
<td>Total General Expenses</td>
<td>1,197,000</td>
<td>1,872,000</td>
<td>1,568,000</td>
</tr>
<tr>
<td>Other Acquisition Expenses</td>
<td>1,780,000</td>
<td>2,175,000</td>
<td>2,640,000</td>
</tr>
<tr>
<td>Taxes, Licenses, and Fees</td>
<td>500,000</td>
<td>625,000</td>
<td>750,000</td>
</tr>
</tbody>
</table>

a. (1 point)

Beginning on January 1, 2005 all policies written and renewed had commissions changed in order to allow the company to compete more effectively. This new commission rate is expected to continue into the future.

As the actuary for this insurance company, briefly explain the commission provision you would recommend for use in the next rate revision to be effective July 1, 2006. Show all work.

b. (2 points)

As shown in the table above, during 2004 the company paid a one-time expense associated with a reduction in staff. This reduction was due to increases in productivity and resulted in fewer employees during 2005. This new level of staffing is expected to continue.

As the actuary for this insurance company, briefly explain the general expense provision you would recommend for use in the next rate revision to be effective July 1, 2006. Show all work.

CONTINUED ON NEXT PAGE

17
34. (1.5 points)

Based on the Expense Fee Method described by Schofield, answer the questions below using the following information. Show all work.

Statewide average loss cost per exposure: $500

<table>
<thead>
<tr>
<th>Expense Type</th>
<th>Expense Ratio</th>
<th>% Fixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissions</td>
<td>15%</td>
<td>0%</td>
</tr>
<tr>
<td>Other Acquisition Expenses</td>
<td>4%</td>
<td>80%</td>
</tr>
<tr>
<td>General Expenses</td>
<td>8%</td>
<td>60%</td>
</tr>
<tr>
<td>Taxes, Licenses, and Fees</td>
<td>4%</td>
<td>20%</td>
</tr>
<tr>
<td>Profit and Contingency</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Other Expenses</td>
<td>2%</td>
<td>100%</td>
</tr>
</tbody>
</table>

a. (1 point)

Calculate the expense fee ratio.

b. (0.5 point)

Calculate the expense fee.
35. (3 points)

You are doing a rate review for commercial general liability and have the following information:

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultimate Trended Loss Ratio</td>
<td>45%</td>
<td>65%</td>
<td>52%</td>
</tr>
<tr>
<td>Weight</td>
<td>20%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>Number of Reported Claims</td>
<td>1,945</td>
<td>2,370</td>
<td>2,260</td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Credibility Claims</td>
<td>10,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective date</td>
<td></td>
<td>June 1, 2005</td>
<td></td>
</tr>
<tr>
<td>Date of this change</td>
<td></td>
<td>September 1, 2006</td>
<td></td>
</tr>
<tr>
<td>Amount of last indication</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last rate change taken</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Expense Provisions

<table>
<thead>
<tr>
<th>Expenses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissions and Other Acquisition Expenses</td>
<td>25%</td>
</tr>
<tr>
<td>Taxes, Licenses, and Fees</td>
<td>3%</td>
</tr>
<tr>
<td>General Expenses</td>
<td>14%</td>
</tr>
<tr>
<td>Profit and Contingency</td>
<td>5%</td>
</tr>
</tbody>
</table>

Trend Assumptions

<table>
<thead>
<tr>
<th>Trend</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency trend</td>
<td>2%</td>
</tr>
<tr>
<td>Severity trend</td>
<td>4%</td>
</tr>
<tr>
<td>Premium trend</td>
<td>3%</td>
</tr>
</tbody>
</table>

Using the methodology discussed by Graves and Castillo, answer the following questions. Show all work.

a. (1 point)

Calculate the indicated rate change before considering credibility.

b. (1 point)

Calculate the C-factor assuming that the target loss ratio remained unchanged.

c. (1 point)

Calculate the credibility weighted indicated rate change.
36. (4 points)

Using the methods described by McClenahan, and the following information, answer the questions below. Show all work.

- Experience period on-level earned premium = $500,000
- Experience period trended and developed losses = $300,000
- Experience period earned exposure = 10,000
- Premium-related expenses factor = 23%
- Non-premium-related expenses = $21,000
- Profit and Contingency factor = 5%

a. (1.5 points)

Calculate the indicated rate level change using the loss ratio method.

b. (1.5 points)

Calculate the indicated rate level change using the pure premium method.

c. (1.0 point)

Describe one situation in which it is preferable to use the loss ratio method, and one situation in which it is preferable to use the pure premium method.

37. (1 point)

There are several ratemaking techniques that can be used to recognize the differences between large risks and small risks for Workers' Compensation insurance. Select two of these techniques and explain how they account for these differences.
38. (3 points)

Finger in *Risk Classification* discusses various criteria for selecting rating variables. As the actuary for an insurance company, you are developing an auto class plan in which one of the proposed rating variables is estimated miles driven during the coverage period.

a. (1.5 points)

Identify and briefly describe two actuarial criteria, and explain whether mileage defined this way satisfies these criteria.

b. (1.5 points)

Identify and briefly describe two operational criteria, and explain whether mileage defined this way satisfies these criteria.

39. (2 points)

Based on the information below, calculate the revised base rate. Show all work.

<table>
<thead>
<tr>
<th>Class</th>
<th>Current Relativities</th>
<th>On-level Premium</th>
<th>Experience Loss and ALAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (base)</td>
<td>1.00</td>
<td>$15,000</td>
<td>$7,500</td>
</tr>
<tr>
<td>2</td>
<td>1.50</td>
<td>10,500</td>
<td>5,600</td>
</tr>
<tr>
<td>3</td>
<td>2.00</td>
<td>8,000</td>
<td>4,500</td>
</tr>
</tbody>
</table>

Current Base Rate = $250
Overall Indicated Rate Change = +12%

40. (1 point)

Identify and explain two reasons for the increased use of large deductible policies.
EXAM 5, SPRING 2006, SECTION II

41. (2.5 points)

The following is a healthcare provider’s historical distribution of annual claim costs per member:

<table>
<thead>
<tr>
<th>Interval</th>
<th>Probability</th>
<th>Average Claim Size in Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>80%</td>
<td>$0</td>
</tr>
<tr>
<td>$0 - $20,000</td>
<td>15%</td>
<td>$5,000</td>
</tr>
<tr>
<td>$20,000 - $40,000</td>
<td>3%</td>
<td>$30,000</td>
</tr>
<tr>
<td>$40,000+</td>
<td>2%</td>
<td>$60,000</td>
</tr>
</tbody>
</table>

a. (1 point)

Calculate the expected annual claim costs excess of a $20,000 deductible. Show all work.

b. (1.5 points)

Assume the healthcare provider institutes managed care guidelines that have the effect of reducing the cost of each claim by 50%. By what percentage will the expected annual claim costs excess of a $20,000 per claim deductible decrease as a result of these measures? Show all work.
42. (3.5 points)

You are given the following information:

<table>
<thead>
<tr>
<th>Claim</th>
<th>Loss Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$50,000</td>
</tr>
<tr>
<td>2</td>
<td>500,000</td>
</tr>
<tr>
<td>3</td>
<td>600,000</td>
</tr>
<tr>
<td>4</td>
<td>200,000</td>
</tr>
<tr>
<td>5</td>
<td>10,000</td>
</tr>
<tr>
<td>6</td>
<td>90,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Limit</th>
<th>Increased Limit Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>1.00</td>
</tr>
<tr>
<td>100,000</td>
<td>1.50</td>
</tr>
<tr>
<td>250,000</td>
<td>2.00</td>
</tr>
<tr>
<td>500,000</td>
<td>2.50</td>
</tr>
</tbody>
</table>

- Earned Exposures = 1,000
- Basic Limit = $10,000

a. (1.5 points)

Using the increased limits factors method described by Boor, calculate the complement of credibility for loss costs in the layer $250,000 excess of $250,000. Show all work.

b. (1.5 points)

Calculate the complement of credibility for loss costs in the layer $250,000 excess of $250,000 using the increased limits factors and losses capped at $100,000. Show all work.

c. (0.5 point)

Explain why an actuary might prefer the approach in part b. above to the approach in part a. above when calculating the complement of credibility for excess loss ratemaking.
43. (1 point)

An insurance company currently writes homeowners insurance at an average 80% insurance to value ratio. The company's underwriting department is pursuing a re-inspection initiative to increase the insurance to value ratio of the book of business.

a. (0.5 point)

Give one reason the initiative may increase the premium volume and one reason it may decrease premium volume.

b. (0.5 point)

Give one reason the initiative may increase the indemnity payments and one reason it may decrease indemnity payments.

44. (2.5 points)

You are given the following assumptions for an insured book of property business:

- A company writes 1,000 property policies.
- Each property is valued at $500,000.
- Exactly 20 of these properties will experience a loss during one policy period.
- The losses are distributed as shown in the table below:

<table>
<thead>
<tr>
<th>S(L)</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>$100,000</td>
</tr>
<tr>
<td>20%</td>
<td>200,000</td>
</tr>
<tr>
<td>10%</td>
<td>300,000</td>
</tr>
<tr>
<td>5%</td>
<td>400,000</td>
</tr>
<tr>
<td>15%</td>
<td>500,000</td>
</tr>
</tbody>
</table>

Find the premium rate per $100 of insurance for a policy face equaling $400,000. Show all work.
45. (1 point)

The actuary of an insurance company develops a hurricane provision for the company’s prospective rates by averaging the company’s historical losses for all states in which it has hurricane exposure, and then applying this provision evenly across these states.

According to Burger et al, state four potential disadvantages of this methodology.

46. (3 points)

The pricing actuary at ABC Insurance Company is being asked to update the overall statewide base class loss cost and territorial base class loss costs for State X effective January 1, 2006. ABC has been incorporating hurricane modeling into their rate reviews for several years and plan to do so in this rate review as well. The pricing actuary has the following information to update the new loss costs for ABC:

<table>
<thead>
<tr>
<th>Rating Territory</th>
<th>Relativity to Statewide of Current Base Class Loss Cost</th>
<th>Aggregate Loss Cost Volume at Current Level</th>
<th>Non-Hurricane Relativity to Statewide in Current Base Class Loss Cost</th>
<th>Projected Experience Non-Hurricane Base Class Loss Cost</th>
<th>Credibility</th>
<th>Modeled Hurricane Base Loss Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.82</td>
<td>$2,340,000</td>
<td>0.775</td>
<td>$580.00</td>
<td>0.50</td>
<td>$50.00</td>
</tr>
<tr>
<td>B</td>
<td>0.95</td>
<td>725,000</td>
<td>0.829</td>
<td>750.00</td>
<td>0.20</td>
<td>140.00</td>
</tr>
<tr>
<td>C</td>
<td>1.50</td>
<td>942,000</td>
<td>1.064</td>
<td>448.00</td>
<td>0.20</td>
<td>54.00</td>
</tr>
</tbody>
</table>

Using the methodology discussed by Burger et al, determine the indicated relative base class change for each of the territories. Show all work.

47. (1.5 points)

According to Prevosto, state and describe two different uses for aggregate insurance statistical data.
48. (1.5 points)

Identify and describe three of the five major data collection plans at NCCI. Specifically identify whether the data call uses aggregate or detailed data and what it is used for.

49. (2 points)

Given the following information for a commercial general liability risk, calculate the experience (Credit)/Debit based on the ISO CGL Experience Rating Plan. Show all work.

Actual Losses in the experience period valued as of March 31, 2006:

<table>
<thead>
<tr>
<th>Claim</th>
<th>Loss</th>
<th>ALAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1,000</td>
<td>$200</td>
</tr>
<tr>
<td>2</td>
<td>1,500</td>
<td>200</td>
</tr>
<tr>
<td>3</td>
<td>5,000</td>
<td>800</td>
</tr>
<tr>
<td>4</td>
<td>6,000</td>
<td>1,000</td>
</tr>
<tr>
<td>5</td>
<td>12,000</td>
<td>1,800</td>
</tr>
<tr>
<td>6</td>
<td>23,000</td>
<td>2,200</td>
</tr>
<tr>
<td>7</td>
<td>120,000</td>
<td>40,000</td>
</tr>
</tbody>
</table>

Expected Unreported Losses and ALAE @ March 31, 2006 = $45,000
Company Subject Basic Limits Loss and ALAE costs = $250,000

Basic Limit = $100,000
MSL = $150,000
Expected Experience Ratio = 0.9
Credibility = 0.6
EXAM 5, SPRING 2006, SECTION II

50. (5.75 points)

You are the actuary for an insurance company that is considering offering a 5% discount to retired drivers in order to improve retention. Using the Asset Share Pricing approach described by Feldblum, and the information provided below, determine which alternative is more profitable for a cohort of 65 year-old existing insureds over a three-year time period. Show all work.

<table>
<thead>
<tr>
<th>Year</th>
<th>Persistency With Discount</th>
<th>Persistency Without Discount</th>
<th>Fixed Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100%</td>
<td>100%</td>
<td>$40</td>
</tr>
<tr>
<td>2</td>
<td>98%</td>
<td>90%</td>
<td>42</td>
</tr>
<tr>
<td>3</td>
<td>95%</td>
<td>85%</td>
<td>44</td>
</tr>
</tbody>
</table>

- First-year average premium (with no discount) $800
- First-year average losses $500
- Average annual premium trend 5%
- Loss cost trend per annum 5%
- New Business Variable Expenses 30% of premium
- Renewal Business Variable Expenses 20% of premium
- Annual Cost of Capital 10%
- Assume there are no taxes.
- For this cohort of business, average loss costs in any policy year are 1% lower than in the preceding policy year after adjustment for loss cost trend.
Spring 2006 Exam 5 Multiple Choice Answers

1 C
2 E
3 A
4 D
5 C
6 Question Deleted
7 A
8 E
9 C & E
10 A
QUESTION 11
Sample Answer
Residual Market – employers that can’t find coverage in the voluntary market can find coverage in the assigned-risk market.
Self-insurance – large employers with enough capital can set aside funds for workers’ compensation claims.
State Fund – some states provide workers’ compensation to insurance to employers either in competition with private insurers or as a monopoly.
- OR -
Excess Insurance – employers may decide to purchase this coverage for catastrophic losses.

QUESTION 12
Sample Answer
Dual Capacity – when the employee sues employer in a capacity other than employer (eg. Manufacturer)
Third Party Over – when third party sues employer after being sued by employee. Third party claims employer has contributory negligence.
Care and Loss of Service – when spouse or family member sues for loss of companionship, services, or consortium.
- OR -
Consequential Bodily Injury – when family member suffers bodily injury as a result of injury to the employee and sues to recover damages from employer.

QUESTION 13
Sample Answer
Part a.
Strict liability in tort means that a manufacturer can be held liable without needing to show negligence.

Part b.
1 – The product was defective when it left the manufacturers control.
2 – The defect created an unreasonable hazardous condition.
3 – The defective product was the proximate cause of the plaintiff’s damages.

Part c.
Intentional Torts – A deliberate wrongdoing against the rights of others. May also be a crime, but not necessarily.
Negligence – A breach of the duty to exercise due care that a reasonably prudent person would exercise in a given situation.
QUESTION 14
Sample Answer
Part a.
1 – Eliminates coverage for loss exposures that are uninsurable.
2 – Assists in keeping premiums at a reasonable level.
3 – Eliminates coverage not needed by the typical purchaser.
4 – Eliminates coverage duplication.
   - OR -
5 – Assist in management of moral and morale hazards.
6 – Eliminate coverages requiring special treatment.

Part b.
1 – War
2 – Wear and Tear is excluded in property and auto physical damage policies to keep premiums reasonable.
3 – Exclusion of use of autos as livery conveyance in personal auto policy.
4 – Electronic devices not permanently fixed in autos, not covered by auto policy, is covered under the homeowner policy. Allows coverages to dovetail with each other.
   - OR -
5 – Bodily injury intended by the insured.
6 – Steam boiler explosions.
**QUESTION 15**

**Sample Answer**

**Part a.**

<table>
<thead>
<tr>
<th></th>
<th>Jeff</th>
<th>Passenger 1</th>
<th>Passenger 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss</td>
<td>120,000</td>
<td>100,000</td>
<td>80,000</td>
<td>300,000</td>
</tr>
<tr>
<td>w/ interest</td>
<td>132,000</td>
<td>110,000</td>
<td>88,000</td>
<td>330,000</td>
</tr>
<tr>
<td>Coverage under Bob’s</td>
<td>100,000 (per person limit)</td>
<td>100,000</td>
<td>88,000</td>
<td>288,000 (within 300,000 limit)</td>
</tr>
<tr>
<td>Coverage under Jeff’s</td>
<td>25,000 (per person limit)</td>
<td>10,000</td>
<td></td>
<td>35,000 (within 50,000 limit)</td>
</tr>
</tbody>
</table>

15,000 for Jeff’s car is covered under Bob’s PD coverage because it is < 50,000.
10,000 – 250 deductible = 9,750 for Bob’s car is covered under Bob’s collision coverage.
Bob’s total = 288,000 + 15,000 + 9,750 = 312,750

**Part b.**

David’s PAP will pay 25,000 for Jeff’s BI and 10,000 for Pass 1’s BI.
David’s PAP will pay 150 of Bob’s deductible for the damage to Bob’s car.
So David’s PAP pays 35,150
Bob’s PAP pays 312,750
Total = 347,900
Left over = 7,000 + 100 = 7,100 Not Paid

**Part c.**

No, it would not. As long as Bob asks the company to insure the car within 14 days it will be covered.
QUESTION 16
Sample Answer
CGL =
1,000,000 per-occurrence limit
+ 25,000 pre-judgment interest (only pays PJI on part of award that company pays)
+ 300,000 defense costs (paid in addition to limit)
= 1,325,000

Umbrella =
1,000,000 XS over CGL per-occurrence limit
+ 25,000 pre-judgment interest not covered by CGL
= 1,025,000

Insured =
Pays nothing – self insured retention only applies if underlying policy doesn’t cover the loss.

QUESTION 17
Sample Answer
Loss = 50,000
Since BPP, deductible is subtracted last.

Assume no coinsurance provision, as none has been stated.
Covered Amount
= (loss) x (limit/value) - deductible
= 50,000 x (150,000/200,000) – 1,000 = 36,500

If 80% coinsurance provision
Covered Amount
= (loss) x (limit/(value x coins)) - deductible
= 50,000 x 150,000/(200,000 x 80%) – 1,000 = 45,875

QUESTION 18
Sample Answer
Contractual liability – when one party breaks the terms of a contract, they are liable for outcome.
Statutory liability – liability based on laws. For example, workers compensation.
Vicarious liability – one party is liable for the actions of another person, usually an employer-employee relationship or child-parent relationship (employer liable for employee’s action; parent liable for child’s actions)
- OR -
Criminal Liability – criminals are legally liable in civil courts to their victims.
QUESTION 19
Sample Answer
Part a.
Insurer agrees to pay an agreed amount for a stated period of time. The settlement is usually funded with the purchase of an annuity. This is used because the cost of the annuity (which is the present value of future payments) is less than the liability settlement amount. Useful when claimant is likely to squander settlement.

Part b.
Payments are made to the insured as expenses are incurred but before the claim is settled or closed. General release not signed by insured. This is used to discourage insureds from retaining the services of an attorney.

Part c.
Lump sum payment is made to insured to settle the claim. No general release is signed by insured. This is used to stop further attorney involvement and to stop insured from seeking additional damages.

QUESTION 20
Sample Answer
ABC would expect to see higher loss ratios than its competitors. Risks with good experience would receive a better rate if experience rating was applied, and would choose to insure with one of ABC’s competitors, taking advantage of the lower premium offered. Poor risks, on the other hand, would be disadvantaged by the application of experience rating, and would choose ABC’s unadjusted manual rate. ABC’s choice to excuse the experience rating component has resulted in them being adversely selected against, in that poor risks with poor experience are choosing ABC’s manual rate, resulting in a higher loss ratio than its competitors.

QUESTION 21
Sample Answer
Part a.
Company BBB will likely have lower commissions on renewal because under the exclusive agency system, agents do not own the expirations. Under the independent agency system, agents do own the expirations, and if a lower commission is given on renewal, they may move the policies elsewhere to get the new business commission.

Part b.
This is more important in personal lines, because cost is more important than service. Lower commissions on renewal means lower premiums, in exchange for less service.
QUESTION 22
Sample Answer
Part a.
1 – Price is low and supply is low because insurers left the market due to poor results.
2 – Because supply is low, not every insured will be able to find coverage, so insurers can increase price.
3 – As this continues, insurers results begin to improve, and surplus increases, so insurers can increase supply of insurance.
4 – New entities increase supply by entering market. Price is high, supply is excessive.
5 – Now some underwriters will have to lower price to meet premium targets. Price is decreasing, supply is still excessive.
6 – As this continues, prices are cut more, and poor results begin.
7 – This forces some entities out of the market, reducing supply. Start back at 1.

Part b.
As market begins to harden they strengthen reserves (more than necessary) and show less profit. This lengthens the hard market by delaying the influx of new insurers until results look better. However, as market softens, they take down reserves to make results look better which lengthens the soft market. Thus the length of the market cycle is extended by this behavior. Consistently setting appropriate reserves would shorten the cycle.

QUESTION 23
Sample Answer
Part a.
1 – For employees there is a reduction in out of pocket expenses.
2 – For employers, there is a cost savings through reduced utilization.

Part b.
1 – From patient’s perspective, emphasis on cost control can come at the expense of proper treatment.
2 – From the physician’s perspective, the need for authorization prior to treatment can have a straight-jacketing effect.

Part c.
1 – Assumes contractual responsibility for providing a defined range of medical services.
2 – Receives a fixed payment per member for the obligation assumed above.

Part d.
A PPO brokers health care services between the service provider and service purchaser. Unlike an EPO it covers part of the costs members incur outside of the network of preferred providers. EPOs only cover services obtained within the network.
QUESTION 24
Sample Answer
Part a.
Workers compensation medical benefits coverage provides for the cost of medical
treatment and should be the same per employee regardless of their salary. An alternative
exposure base would be man-hours worked because the amount of time an employee is
on the job is correlated to their exposure to an injury requiring a medical benefit.

Part b.
Workers compensation indemnity benefits can be limited to a minimum or maximum
payment by the state’s workers compensation laws. A company’s total payroll would not
account for the increase in indemnity payments for employees earning below the
minimum or a reduction is indemnity payments for employees earning above the
maximum. A limited payroll exposure base to account for these differences would be
more appropriate than total payroll.

QUESTION 25
Sample Answer
Part a.
1 – Verifiable.
2 – Vary with hazard.
- OR -
3 – Be practical

Part b.
1 – It is easier to verify that there is a home (# homes) rather than the value of home.
Thus # homes is better for verifiability.
2 – Coverage A amount is better exposure base for varying with hazard. The amount of
damage and loss depends on the value of the home.
- OR -
3 – # homes is more practical since Coverage A amount is subject to some judgement.
QUESTION 26
Sample Answer
Part a.

Trended Premium = $42,500,000 * (1.05)^2.25 * (1.03)^2.417 = $50,943,928

Part b.

Trended Premium = $42,500,000 * (1.05)^2.5 * (1.03)^2.417 = $51,571,159

Part c.
1-step-trending assumes uniform trend from the experience period to the future policy period. This assumption does not apply to certain situations where there are differences in trend between the past and the future. The 2-step trend solves this problem.
QUESTION 27
Sample Answer
Part a.
Total premiums are affected by exposure changes, while average premiums have averaged exposure effects out. Thus changes in average premium are more related to the premium trend.

Part b.
1 – The premiums being trended are earned premiums, thus it is better to use average earned premiums in the premium trend analysis.
2 – Average written premiums are more responsive to recent changes.

QUESTION 28
Sample Answer
Part a.

2004 2005

<table>
<thead>
<tr>
<th></th>
<th>5/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
<td>1.00</td>
</tr>
<tr>
<td>Factor</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Average Rate Level for 2005 = \((1/2)(4/12)^2(1.00) + (1 – (1/2)(4/12)^2)(0.92)\) = 0.9244
Current Rate Level = 0.92
On-level Factor for 2005 = 0.92/0.9244 = 0.9952

Part b.
No, the calculation is not reasonable because the parallelogram method assumes uniform distribution of written policies throughout the year. More policies written in May and June will actually increase the On-level Factor closer to one.

Part c.
Policies written in 2004 at rate level 1.00, but earned in 2005 (as % of 2005 total earned):

<table>
<thead>
<tr>
<th>Month</th>
<th>Percentage</th>
<th>Rate Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2004</td>
<td>0.05</td>
<td>0.5/12</td>
</tr>
<tr>
<td>Feb 2004</td>
<td>0.05</td>
<td>1.5/12</td>
</tr>
<tr>
<td>Mar 2004</td>
<td>0.05</td>
<td>2.5/12</td>
</tr>
<tr>
<td>Apr 2004</td>
<td>0.05</td>
<td>3.5/12</td>
</tr>
<tr>
<td>Total</td>
<td>0.0021 + 0.0063 + 0.0104 + 0.0146 = 0.0334</td>
<td></td>
</tr>
</tbody>
</table>

Average Rate Level for 2005 = 0.0334(1.00) + .9666(0.92) = 0.9227
Current Rate Level = 0.92
On-level Factor for 2005 = 0.92 / 0.9227 = 0.9971
QUESTION 29
Sample Answer

Part a.

<table>
<thead>
<tr>
<th>PY</th>
<th>27-39</th>
<th>39-51</th>
<th>51-63</th>
<th>63-75</th>
<th>75-ult</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td></td>
<td></td>
<td>1.080</td>
<td></td>
<td></td>
</tr>
<tr>
<td>00</td>
<td></td>
<td></td>
<td>1.100</td>
<td>1.085</td>
<td></td>
</tr>
<tr>
<td>01</td>
<td></td>
<td>1.200</td>
<td>1.140</td>
<td>1.075</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>1.324</td>
<td>1.153</td>
<td>1.120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>1.280</td>
<td>1.180</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>1.340</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3-Yr Avg</td>
<td></td>
<td>1.315</td>
<td>1.178</td>
<td>1.120</td>
</tr>
<tr>
<td></td>
<td>Age-Age</td>
<td></td>
<td>1.967</td>
<td>1.496</td>
<td>1.270</td>
</tr>
</tbody>
</table>

2003 Ult Loss – 7,505(1.27) = 9531.35

Part b.
Following Graves and Castillo, repeat the 63-75 factor as the 75-ultimate LDF. This assumes that each subsequent link ratio is the square root of the previous.

Part c.

<table>
<thead>
<tr>
<th>PY</th>
<th>63-75</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>1.101</td>
</tr>
<tr>
<td>00</td>
<td>1.139</td>
</tr>
<tr>
<td>01</td>
<td>1.119</td>
</tr>
</tbody>
</table>

3-Yr Avg = 1.120
Li = 366 + 381 + 503 = 1,250
Z = Li/Li + K = 1,250 / (1,250 + 1,250) = 0.50
63-75 Cred Wtd Link Ratio = 0.50(1.12) + 0.50(1.08) = 1.10
QUESTION 30
Sample Answer
Earned Exposures for Report Year 2002, lag 0

Policy Group #1 = (12 * 12 * 0.5) / (12 * 12 * 0.5) x 1,000 = 1,000.00
Policy Group #2 = (9 * 9 * 0.5 + 9 * 3) / (12 * 12 * 0.5) x 500 = 468.75
Total Earned Exposures = 1,000.00 + 468.75 = 1,468.75

2002 Pure Premium = 4,406,250 / 1,468.75 = 3,000
2003 Pure Premium = 3,000 * 1.1 = 3,300
2003 Rate = (PP + FE) / (1 – VE – P) = (3,300 + 100)/(1-.15-0.05) = 4,250

QUESTION 31
Sample Answer
Part a.

<table>
<thead>
<tr>
<th>Claim</th>
<th>Ground-Up Loss</th>
<th>Ground-Up Loss</th>
<th>50x100</th>
<th>50x100</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75,000</td>
<td>82,500</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>100,000</td>
<td>110,000</td>
<td>0</td>
<td>10,000</td>
</tr>
<tr>
<td>3</td>
<td>125,000</td>
<td>137,500</td>
<td>25,000</td>
<td>37,500</td>
</tr>
<tr>
<td>4</td>
<td>150,000</td>
<td>165,000</td>
<td>50,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Total</td>
<td>450,000</td>
<td>495,000</td>
<td>75,000</td>
<td>97,500</td>
</tr>
</tbody>
</table>

Inflation Rate 10.0% 30.0%

Part b.
The excess layer inflation rates are greater than the basic limit inflation rates for two reasons:
1. For losses already in the excess layer, inflation impacts only the portion of the loss in the excess layer. The basic limits portion does not change.
2. For losses near the basic limit, inflation causes the losses to pierce the increased limits layer, resulting in increased frequency of increased limits losses.
QUESTION 32
Sample Answer
Part a.
Policy Year – Group premium and losses based upon policies issued during a given block of time.
Calendar Year – Experience for a given block of time. Premiums = written premium during the period + unearned premium reserve at beginning of period – unearned premium reserve at end of period. Losses = paid losses during period + reserves at end of period – reserves at beginning of period.
Accident Year – Premiums are the same as calendar year. Losses are grouped based upon accidents occurring during the period.

Part b.
Calendar Year data is the most responsive because it is the most mature. Policy year is the least responsive because it is the least mature.

QUESTION 33
Sample Answer
Part a.
Use the 2005 ratio because it is most indicative of the future. Use Written Premium because commission is generally paid at onset of policy.
3,000,000 / 30,000,000 = 10%

Part b.
Use 3-year averages for home office utilities and all other general expense.
Use the 2005 ratio for salaries to reflect the new staffing level.
Ignore the one-time expense since it is non-recurring.
Use earned premium since general expenses are usually incurred throughout the policy period.
Utilities
= ((209,000/19,000,000) + (216,000/24,000,000) + (280,000/28,000,000))/3 = 1.0%
All other
= ((190,000/19,000,000) + (240,000/24,000,000) + (280,000/28,000,000))/3 = 1.0%
Salaries
= 1,008,000/28,000,000 = 3.6%
Total
= 1.0%+1.0%+3.6% = 5.6%
QUESTION 34
Sample Answer

<table>
<thead>
<tr>
<th>Expense Type</th>
<th>Total %</th>
<th>Fixed %</th>
<th>Variable %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commission</td>
<td>15</td>
<td>0.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Other Acquisition</td>
<td>4</td>
<td>3.2</td>
<td>0.8</td>
</tr>
<tr>
<td>General</td>
<td>8</td>
<td>4.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Tax, Lic, Fees</td>
<td>4</td>
<td>0.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Profit and Cont</td>
<td>5</td>
<td>0.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>11.3</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Part a.
Expense Fee Ratio = Fixed / 1 – Variable = 0.113 / (1.000 – 0.267) = 0.154

Part b.
Expense Fee
= Statewide Average Rate x Expense Fee Ratio
= (Loss Cost / ( 1 – Expenses)) x Expense Fee Ratio
= (500 / (1 - 0.38)) x 0.154
= 124.20

QUESTION 35
Sample Answer

Part a.
ELR=1-V = (1.00-0.25-0.03-0.14-0.05)=0.53
WLR=0.45*0.2+0.65*0.3+0.52*0.5 = 0.545
0.545/0.530-1= +2.83%

Part b.
C-factor = 0.53*((1.04*1.02)/1.03)^15/12x1.08/1.03 = 0.5766

Part c.
Z=square root ((1,945+2,370+2,260)/10,000) = 0.8109
CLR=0.8109*(0.545)+.1891*(0.5766) = 0.5510
Indicated Change = 0.551 / 0.53 – 1.00 = +3.96%
QUESTION 36
Sample Answer

Part a.

\[ G = \text{Fixed expense ratio} = \frac{21,000}{300,000} = 7\% \]

\[ V = \text{Premium-related expense factor} = 23\% \]

\[ Q = \text{Profit and Contingencies factor} = 5\% \]

\[ T = \text{Target loss ratio} = \frac{1 - V - Q}{1 + G} = \frac{1 - 23\% - 5\%}{1 + 7\%} = 67.3\% \]

\[ W = \text{Experience loss ratio} = \frac{300,000}{500,000} = 60.0\% \]

\[ \text{Indicated rate level change} = \frac{60.0\%}{67.3\%} - 1 = -10.8\% \]

Part b.

\[ P = \text{Pure Premium} = \frac{300,000}{10,000} = 30.0 \]

\[ F = \text{Fixed expenses per exposure unit} = \frac{21,000}{10,000} = 2.1 \]

\[ R = \text{Indicated Rate} = \frac{P + F}{1 - V - Q} = \frac{30 + 2.1}{1 - 0.23 - 0.05} = 44.6 \]

\[ \text{Current Rate} = \frac{500,000}{10,000} = 50.0 \]

\[ \text{Indicated Rate Level Change} = \frac{44.6}{50.0} - 1 = -10.8\% \]

Part c.

- The loss ratio method is preferable when the exposure unit is not available.
- The loss ratio method is preferable when the exposure unit is not reasonably consistent between risks.
- The pure premium method is preferable for a new line of business.
- The pure premium method is preferable where on-level premium is difficult to calculate.
QUESTION 37
Sample Answer
Expense Constant – Fixed expenses are allocated on a per policy basis rather than on a per exposure basis. This accounts for the fact that certain expenses are incurred no matter how large or how small an insured may be. An expense constant is a fixed amount added to otherwise chargeable premium.
Loss Constant – Small risks tend to have higher loss ratios due to less incentive to reduce costs (due to lower credibility than large risks) and less resources to implement changes to reduce frequency and severity. Loss constants represent an attempt to equalize loss ratios among large and small risks. A loss constant is an addition to otherwise chargeable premium for designated “small” risks.
- OR -
Premium Discounts – similar to loss constants
Experience Rating Plans – similar to loss constants.

QUESTION 38
Sample Answer
Part a.
1 – Homogeneity (relates to similar insured being grouped together) – If you group insured by miles driven, you are in fact putting similar exposures to loss together, so their average loss cost should be similar.
2 – Credibility (having enough data to estimate future costs) – If you segment miles driven into large enough discrete ranges, you should have enough data to accurately estimate future loss costs.
- OR -
3 – Accuracy (variables should be related to costs) – Higher mileage > Higher exposure > Higher costs
4 – Reliability (variables should have predictive stability over time) – Higher mileage and higher costs should have a stable relationship over time.

Part b.
1 - Verifiable/Available (the rating variable is easily available for rating purposes) – “Estimated” miles would need to be audited at end of year and therefore not easily available/verifiable.
2 – Cost Effective (does the increase in accuracy balance the cost of getting data) – Since audits would be required, this variable may not be cost effective.
- OR -
3 – Objective (should be little ambiguity, mutually exclusive and exhaustive classes) – Classes which are mutually exclusive and exhaustive should be easy to derive, and mileage is an objective measure, so mileage is objective.
4 – Related to Costs (should be intuitive relationship to cost) – It is reasonable to expect estimated mileage to be related to costs.
5 – Avoidance of Extreme Discontinuities (rates should change gradually between classes) – This may be difficult at the higher end of the mileage range.
QUESTION 39
Sample Answer

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Current</td>
<td>Onlevel</td>
<td>Class 1</td>
<td>Onlevel</td>
<td>Experience</td>
<td>Loss and</td>
<td>Indicated</td>
</tr>
<tr>
<td></td>
<td>Relativities</td>
<td>Premium</td>
<td>Relativities</td>
<td>Premium</td>
<td>ALAE</td>
<td>Ratio</td>
<td>Relativities</td>
</tr>
<tr>
<td>1</td>
<td>1.000</td>
<td>15,000</td>
<td>15,000</td>
<td>7,500</td>
<td>0.500</td>
<td>1.000</td>
<td>15,000</td>
</tr>
<tr>
<td>2</td>
<td>1.500</td>
<td>10,500</td>
<td>7,000</td>
<td>5,600</td>
<td>0.800</td>
<td>1.600</td>
<td>11,200</td>
</tr>
<tr>
<td>3</td>
<td>2.000</td>
<td>8,000</td>
<td>4,000</td>
<td>4,500</td>
<td>1.125</td>
<td>2.250</td>
<td>9,000</td>
</tr>
<tr>
<td></td>
<td>33,500</td>
<td>26,000</td>
<td>17,600</td>
<td>35,200</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(9) Current Base Rate $250.00
(10) Indicated Rate Change 1.1200
(11) Off Balance 0.9517 = (3) Total / (8) Total
(12) Revised Base Rate $266.48 = (9) x (10) x (11)

QUESTION 40
Sample Answer

1. – Increased incentive for loss control – Since insureds bear more of their own risk, they are more likely to take actions to minimize costs.
2. – Improved cash flows – Insureds are able to hold on to some of their money for longer since they pay a lower premium up front and there will be a lag until losses are reported and paid. Allows for potential investment income which may be greater than the discount the insurer uses in premium calculation.
   - OR -
3 – Insurance Cost Savings – If the insured is a better than average risk for insurers’ rating classifications, the insured may be able to reduce its overall insurance costs.
4 – Reduced Residual Market Burdens – Shifting insureds from a first dollar policy to a large deductible policy reduces the insurer’s premium volume and hence its share of the assigned risk losses.

QUESTION 41
Sample Answer

Part a.
The annual cost excess of a $20,000 deductible prior to managed care is
\[ 3\% \times 30,000 + 2\% \times 60,000 \] – \([3\% + 2\%] \times 20,000 \] = $1,100.

Part b.
The annual cost subsequent to managed care is
\[ 2\% \times 60,000 \times 50\% \] – 2\% \times 20,000 = $200.

Thus the reduction in the expected excess claim cost is $1,100 - $200 / $1,100 = 81.8\%.
QUESTION 42
Sample Answer

Part a.
First, cap losses at the attachment point and calculate the loss cost:
\[ P_a = (50,000 + 250,000 + 250,000 + 200,000 + 10,000 + 90,000) = 850,000 / 1,000 = 850 \]
Next, calculate the complement:
\[ \text{Complement} = P_a \times \left( \frac{I_{L_a} + 1}{I_{L_a}} - 1 \right) = 850 \times (2.5 / 2.0 - 1) = 212.50 \]

Part b.
First, cap losses at 100,000 and calculate the loss cost:
\[ P_d = (50,000 + 100,000 + 100,000 + 100,000 + 10,000 + 90,000) = 450,000 / 1,000 = 450 \]
Next, calculate the complement:
\[ \text{Complement} = P_d \times \left( \frac{I_{L_d} + 1}{I_{L_d}} - \frac{I_{L_a}}{I_{L_d}} \right) = 450 \times (2.5 / 1.5 - 2.0 / 1.5) = 150 \]

Part c.
Since there is not much data around the attachment point, the losses in the 0-100K layer may be more reliable than those around the 250K limit. (There are only 3 losses that cross into the layer between 100K and 250K, so the data is too thin in that part of the distribution).

QUESTION 43
Sample Answer

Part a.
It will increase premium volume because those that are not insured to a high enough value will increase their amount of insurance generating additional premiums.
It will decrease premium volume because some risks will be canceled as the reinspections find them ineligible for coverage.

Part b.
It will increase indemnity payments because some of the total or near total losses occurring will result in higher indemnity payments than before the limit was increased.
It will decrease indemnity payments because some insureds will take loss-preventative actions as suggested by the inspectors.
It will also decrease indemnity payments to the extent that there are increased cancellations or non-renewals.
QUESTION 44
Sample Answer

Premium per $100 = \frac{1}{F/100} \left[ \sum_{L \in F} L s(L) + (F[1 - \sum_{L \in F} s(L)]) \right]

= 20 / 100 ((.5)100000 + (.2)200000 + (.1)300000 + (.2)400000) / (400000/100)

= 1

QUESTION 45
Sample Answer

1 – Grouping multiple states together into territories may mask the true hurricane exposure of one state.
2 – Hurricane exposure is much greater on the coast than inland. Coastal exposures will be undercharged and inland exposures will be overcharged.
3 – Since hurricane losses occur with low frequency, a single storm may be skewing the overall expected loss cost.
4 – Exposure to hurricane loss changes over time with building codes, distribution of policyholders geographically, inflation on home values, etc. Past hurricane losses are not predictive of the future losses, even if the same storm hit the same area today.
- OR -
5 – Not enough historical insurance data, since the period for which insurance data is available has had fewer hurricanes than previously was the case.
QUESTION 46
Sample Answer

First, calculate total projected base class loss cost

<table>
<thead>
<tr>
<th>Rating Territory</th>
<th>(2) Projected Experience Non-Hurricane Base Class Loss Cost</th>
<th>(3) Credibility</th>
<th>(4) Credibility Weighted Non-Hurricane Base Class Loss Cost</th>
<th>(5) Modeled Hurricane Base Class Loss Cost</th>
<th>(6) Total Base Class Loss Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>580.00</td>
<td>0.50</td>
<td>514.64</td>
<td>50.00</td>
<td>564.64</td>
</tr>
<tr>
<td>B</td>
<td>750.00</td>
<td>0.20</td>
<td>534.47</td>
<td>140.00</td>
<td>674.47</td>
</tr>
<tr>
<td>C</td>
<td>448.00</td>
<td>0.20</td>
<td>583.06</td>
<td>54.00</td>
<td>637.06</td>
</tr>
<tr>
<td>Statewide</td>
<td>579.73</td>
<td></td>
<td>534.32</td>
<td>67.22</td>
<td>601.54</td>
</tr>
</tbody>
</table>

\[ (4) = [(Column (3) \times Column (2))] + [(1 - Column (3)) \times SW of Column 2 \times Non-Hurricane Rel to SW in Current Base Class Loss Cost] \]

\[ (6) = \text{Column (4)} + \text{Column (5)} \]

Next, calculate the indicated relative change

<table>
<thead>
<tr>
<th>Rating Territory</th>
<th>(7) Relativity of Territory in Column (6) to Statewide Column (6)</th>
<th>(8) Relativity to Statewide of Current Base Class Loss Cost</th>
<th>(9) Indicated Relative Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.939</td>
<td>0.82</td>
<td>1.145</td>
</tr>
<tr>
<td>B</td>
<td>1.121</td>
<td>0.95</td>
<td>1.180</td>
</tr>
<tr>
<td>C</td>
<td>1.059</td>
<td>1.50</td>
<td>0.706</td>
</tr>
<tr>
<td>Statewide</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ (9) = \text{COLUMN (7)} / \text{COLUMN (8)} \]

QUESTION 47
Sample Answer

1 – Business use – insurers without a credible data source (low volume, new business, etc) may use aggregate insurance data to develop rates, relativities, mod factors, etc.

2 – Regulatory use – regulators use aggregate data to determine overall rate level, market conduct, financial solvency, etc.
QUESTION 48
Sample Answer
1 – Workers Comp Statistical Plan (WCSP) – Collects policy level premiums and losses by class. Used to calculate class relativities and experience modification factors.
2 – Annual Financial Call Data – Collects aggregate premiums and losses. Used to calculate overall loss costs and perform rate level analysis.
3 – Detailed Claim Information (DCI) – Collects detailed information (785 variables). Used for special analysis and research.
- OR –
4 – Policy Issue Capture System Data – Policy level documents submitted by insurers used to confirm proof of workers’ compensation insurance
5 – Residual Market Data – Aggregate policy year premiums, losses, and expenses submitted by servicing carriers used for pool financial reporting.

QUESTION 49
Sample Answer
Develop MSL Limited Losses and ALAE

<table>
<thead>
<tr>
<th>Claim</th>
<th>Unlimited Loss</th>
<th>100K Limited Loss</th>
<th>Unlimited ALAE</th>
<th>150K MSL Capped Loss and ALAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,000</td>
<td>1,000</td>
<td>+</td>
<td>200</td>
</tr>
<tr>
<td>2</td>
<td>1,500</td>
<td>1,500</td>
<td>+</td>
<td>200</td>
</tr>
<tr>
<td>3</td>
<td>5,000</td>
<td>5,000</td>
<td>+</td>
<td>800</td>
</tr>
<tr>
<td>4</td>
<td>6,000</td>
<td>6,000</td>
<td>+</td>
<td>1,000</td>
</tr>
<tr>
<td>5</td>
<td>12,000</td>
<td>12,000</td>
<td>+</td>
<td>1,800</td>
</tr>
<tr>
<td>6</td>
<td>23,000</td>
<td>23,000</td>
<td>+</td>
<td>2,200</td>
</tr>
<tr>
<td>7</td>
<td>120,000</td>
<td>100,000</td>
<td>+</td>
<td>40,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Actual Experience Ratio = AER
= (Reported + Unreported) / Company Subject BL Loss and ALAE
= (194,700 + 45,000) / 250,000 = 0.9588

Expected Experience Ratio = EER = 0.9

Experience (Credit)/Debit = (AER – EER)/EER x Z = (0.9588 – 0.9)/0.9 x 0.6 = 0.0392
QUESTION 50
Sample Answer

Assume persistency rates given are for that year only, and are not cumulative persistency rates.

<table>
<thead>
<tr>
<th>Year</th>
<th>Prem</th>
<th>PV of Losses</th>
<th>Var Exp</th>
<th>Fix Exp</th>
<th>Pers</th>
<th>Cum Exp</th>
<th>Disc Fact</th>
<th>PV of Profit</th>
<th>PV of Prem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>800</td>
<td>500</td>
<td>160.00</td>
<td>40.00</td>
<td>100%</td>
<td>100%</td>
<td>1.00</td>
<td>100.00</td>
<td>800.00</td>
</tr>
<tr>
<td>2</td>
<td>840.00</td>
<td>519.80</td>
<td>168.00</td>
<td>42.00</td>
<td>90%</td>
<td>90%</td>
<td>1.10</td>
<td>90.16</td>
<td>687.27</td>
</tr>
<tr>
<td>3</td>
<td>882.00</td>
<td>540.39</td>
<td>176.40</td>
<td>44.00</td>
<td>85%</td>
<td>77%</td>
<td>1.21</td>
<td>76.63</td>
<td>557.63</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>266.80</td>
<td>2,044.90</td>
</tr>
<tr>
<td>Return</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Prem</th>
<th>PV of Losses</th>
<th>Var Exp</th>
<th>Fix Exp</th>
<th>Pers</th>
<th>Cum Exp</th>
<th>Disc Fact</th>
<th>PV of Profit</th>
<th>PV of Prem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>760</td>
<td>500</td>
<td>152.00</td>
<td>40.00</td>
<td>100%</td>
<td>100%</td>
<td>1.00</td>
<td>68.00</td>
<td>760.00</td>
</tr>
<tr>
<td>2</td>
<td>798.00</td>
<td>519.80</td>
<td>159.60</td>
<td>42.00</td>
<td>98%</td>
<td>98%</td>
<td>1.10</td>
<td>68.24</td>
<td>710.95</td>
</tr>
<tr>
<td>3</td>
<td>837.90</td>
<td>540.39</td>
<td>167.58</td>
<td>44.00</td>
<td>95%</td>
<td>93%</td>
<td>1.21</td>
<td>66.12</td>
<td>644.70</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>202.36</td>
<td>2,115.64</td>
</tr>
<tr>
<td>Return</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.6%</td>
</tr>
</tbody>
</table>

The more profitable solution is to not offer a discount. For this cohort over a three-year period, the return on premium without the discount is 13.0%, and the return on premium with the discount is only 9.6%.
QUESTION 11
Sample Answer
Residual Market – employers that can’t find coverage in the voluntary market can find coverage in the assigned-risk market.
Self-insurance – large employers with enough capital can set aside funds for workers’ compensation claims.
State Fund – some states provide workers’ compensation to insurance to employers either in competition with private insurers or as a monopoly.
- OR -
Excess Insurance – employers may decide to purchase this coverage for catastrophic losses.

QUESTION 12
Sample Answer
Dual Capacity – when the employee sues employer in a capacity other than employer (eg. Manufacturer)
Third Party Over – when third party sues employer after being sued by employee. Third party claims employer has contributory negligence.
Care and Loss of Service – when spouse or family member sues for loss of companionship, services, or consortium.
- OR -
Consequential Bodily Injury – when family member suffers bodily injury as a result of injury to the employee and sues to recover damages from employer.

QUESTION 13
Sample Answer
Part a.
Strict liability in tort means that a manufacturer can be held liable without needing to show negligence.

Part b.
1 – The product was defective when it left the manufacturers control.
2 – The defect created an unreasonable hazardous condition.
3 – The defective product was the proximate cause of the plaintiff’s damages.

Part c.
Intentional Torts – A deliberate wrongdoing against the rights of others. May also be a crime, but not necessarily.
Negligence – A breach of the duty to exercise due care that a reasonably prudent person would exercise in a given situation.
QUESTION 14
Sample Answer
Part a.
1 – Eliminates coverage for loss exposures that are uninsurable.
2 – Assists in keeping premiums at a reasonable level.
3 – Eliminates coverage not needed by the typical purchaser.
4 – Eliminates coverage duplication.
- OR -
5 – Assist in management of moral and morale hazards.
6 – Eliminate coverages requiring special treatment.

Part b.
1 – War
2 – Wear and Tear is excluded in property and auto physical damage policies to keep premiums reasonable.
3 – Exclusion of use of autos as livery conveyance in personal auto policy.
4 – Electronic devices not permanently fixed in autos, not covered by auto policy, is covered under the homeowner policy. Allows coverages to dovetail with each other.
- OR -
5 – Bodily injury intended by the insured.
6 – Steam boiler explosions.
**QUESTION 15**

*Sample Answer*

**Part a.**

<table>
<thead>
<tr>
<th></th>
<th>Jeff</th>
<th>Passenger 1</th>
<th>Passenger 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loss</strong></td>
<td>120,000</td>
<td>100,000</td>
<td>80,000</td>
<td>300,000</td>
</tr>
<tr>
<td>w/ interest</td>
<td>132,000</td>
<td>110,000</td>
<td>88,000</td>
<td>330,000</td>
</tr>
<tr>
<td>Coverage under Bob’s</td>
<td>100,000</td>
<td>100,000</td>
<td>88,000</td>
<td>288,000</td>
</tr>
<tr>
<td>(per person limit)</td>
<td></td>
<td></td>
<td></td>
<td>(within 300,000 limit)</td>
</tr>
<tr>
<td>Coverage under Jeff’s</td>
<td>25,000</td>
<td>10,000</td>
<td></td>
<td>35,000</td>
</tr>
<tr>
<td>(per person limit)</td>
<td></td>
<td></td>
<td></td>
<td>(within 50,000 limit)</td>
</tr>
</tbody>
</table>

15,000 for Jeff’s car is covered under Bob’s PD coverage because it is < 50,000.
10,000 – 250 deductible = 9,750 for Bob’s car is covered under Bob’s collision coverage.
Bob’s total = 288,000 + 15,000 + 9,750 = 312,750

**Part b.**
David’s PAP will pay 25,000 for Jeff’s BI and 10,000 for Pass 1’s BI.
David’s PAP will pay 150 of Bob’s deductible for the damage to Bob’s car.
So David’s PAP pays 35,150
Bob’s PAP pays 312,750
Total = 347,900
Left over = 7,000 + 100 = 7,100 Not Paid

**Part c.**
No, it would not. As long as Bob asks the company to insure the car within 14 days it will be covered.
QUESTION 16
Sample Answer
CGL =
1,000,000 per-occurrence limit
+ 25,000 pre-judgment interest (only pays PJI on part of award that company pays)
+ 300,000 defense costs (paid in addition to limit)
= 1,325,000

Umbrella =
1,000,000 XS over CGL per-occurrence limit
+ 25,000 pre-judgment interest not covered by CGL
= 1,025,000

Insured =
Pays nothing – self insured retention only applies if underlying policy doesn’t cover the loss.

QUESTION 17
Sample Answer
Loss = 50,000
Since BPP, deductible is subtracted last.

Assume no coinsurance provision, as none has been stated.
Covered Amount
= (loss) x (limit/value) - deductible
= 50,000 x (150,000/200,000) – 1,000 = 36,500

If 80% coinsurance provision
Covered Amount
= (loss) x (limit/(value x coins)) - deductible
= 50,000 x 150,000/(200,000 x 80%) – 1,000 = 45,875

QUESTION 18
Sample Answer
Contractual liability – when one party breaks the terms of a contract, they are liable for outcome.
Statutory liability – liability based on laws. For example, workers compensation.
Vicarious liability – one party is liable for the actions of another person, usually an employer-employee relationship or child-parent relationship (employer liable for employee’s action; parent liable for child’s actions)
- OR -
Criminal Liability – criminals are legally liable in civil courts to their victims.
QUESTION 19
Sample Answer
Part a.
Insurer agrees to pay an agreed amount for a stated period of time. The settlement is usually funded with the purchase of an annuity. This is used because the cost of the annuity (which is the present value of future payments) is less than the liability settlement amount. Useful when claimant is likely to squander settlement.

Part b.
Payments are made to the insured as expenses are incurred but before the claim is settled or closed. General release not signed by insured. This is used to discourage insureds from retaining the services of an attorney.

Part c.
Lump sum payment is made to insured to settle the claim. No general release is signed by insured. This is used to stop further attorney involvement and to stop insured from seeking additional damages.

QUESTION 20
Sample Answer
ABC would expect to see higher loss ratios than its competitors. Risks with good experience would receive a better rate if experience rating was applied, and would choose to insure with one of ABC’s competitors, taking advantage of the lower premium offered. Poor risks, on the other hand, would be disadvantaged by the application of experience rating, and would choose ABC’s unadjusted manual rate. ABC’s choice to excuse the experience rating component has resulted in them being adversely selected against, in that poor risks with poor experience are choosing ABC’s manual rate, resulting in a higher loss ratio than its competitors.

QUESTION 21
Sample Answer
Part a.
Company BBB will likely have lower commissions on renewal because under the exclusive agency system, agents do not own the expirations. Under the independent agency system, agents do own the expirations, and if a lower commission is given on renewal, they may move the policies elsewhere to get the new business commission.

Part b.
This is more important in personal lines, because cost is more important than service. Lower commissions on renewal means lower premiums, in exchange for less service.
QUESTION 22
Sample Answer
Part a.
1 – Price is low and supply is low because insurers left the market due to poor results.
2 – Because supply is low, not every insured will be able to find coverage, so insurers can increase price.
3 – As this continues, insurers results begin to improve, and surplus increases, so insurers can increase supply of insurance.
4 – New entities increase supply by entering market. Price is high, supply is excessive.
5 – Now some underwriters will have to lower price to meet premium targets. Price is decreasing, supply is still excessive.
6 – As this continues, prices are cut more, and poor results begin.
7 – This forces some entities out of the market, reducing supply. Start back at 1.

Part b.
As market begins to harden they strengthen reserves (more than necessary) and show less profit. This lengthens the hard market by delaying the influx of new insurers until results look better. However, as market softens, they take down reserves to make results look better which lengthens the soft market. Thus the length of the market cycle is extended by this behavior. Consistently setting appropriate reserves would shorten the cycle.

QUESTION 23
Sample Answer
Part a.
1 – For employees there is a reduction in out of pocket expenses.
2 – For employers, there is a cost savings through reduced utilization.

Part b.
1 – From patient’s perspective, emphasis on cost control can come at the expense of proper treatment.
2 – From the physician’s perspective, the need for authorization prior to treatment can have a straight-jacketing effect.

Part c.
1 – Assumes contractual responsibility for providing a defined range of medical services.
2 – Receives a fixed payment per member for the obligation assumed above.

Part d.
A PPO brokers health care services between the service provider and service purchaser. Unlike an EPO it covers part of the costs members incur outside of the network of preferred providers. EPOs only cover services obtained within the network.
QUESTION 24
Sample Answer
Part a.
Workers compensation medical benefits coverage provides for the cost of medical treatment and should be the same per employee regardless of their salary. An alternative exposure base would be man-hours worked because the amount of time an employee is on the job is correlated to their exposure to an injury requiring a medical benefit.

Part b.
Workers compensation indemnity benefits can be limited to a minimum or maximum payment by the state’s workers compensation laws. A company’s total payroll would not account for the increase in indemnity payments for employees earning below the minimum or a reduction is indemnity payments for employees earning above the maximum. A limited payroll exposure base to account for these differences would be more appropriate than total payroll.

QUESTION 25
Sample Answer
Part a.
1 – Verifiable.
2 – Vary with hazard.
- OR -
3 – Be practical

Part b.
1 – It is easier to verify that there is a home (# homes) rather than the value of home. Thus # homes is better for verifiability.
2 – Coverage A amount is better exposure base for varying with hazard. The amount of damage and loss depends on the value of the home.
- OR -
3 – # homes is more practical since Coverage A amount is subject to some judgement.
QUESTION 26
Sample Answer

Part a.
\[
\text{Trended Premium} = 42,500,000 \times (1.05)^{2.25} \times (1.03)^{2.417} = 50,943,928
\]

Part b.
\[
\text{Trended Premium} = 42,500,000 \times (1.05)^{2.5} \times (1.03)^{2.417} = 51,571,159
\]

Part c.
1-step-trending assumes uniform trend from the experience period to the future policy period. This assumption does not apply to certain situations where there are differences in trend between the past and the future. The 2-step trend solves this problem.
QUESTION 27
Sample Answer
Part a.
Total premiums are affected by exposure changes, while average premiums have averaged exposure effects out. Thus changes in average premium are more related to the premium trend.

Part b.
1 – The premiums being trended are earned premiums, thus it is better to use average earned premiums in the premium trend analysis.
2 – Average written premiums are more responsive to recent changes.

QUESTION 28
Sample Answer
Part a.

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
<td>1.00</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Average Rate Level for 2005 = \(\frac{1}{2}(4/12)^2(1.00) + (1 - \frac{1}{2}(4/12)^2)(0.92) = 0.9244\)
Current Rate Level = 0.92
On-level Factor for 2005 = \(\frac{0.92}{0.9244} = 0.9952\)

Part b.
No, the calculation is not reasonable because the parallelogram method assumes uniform distribution of written policies throughout the year. More policies written in May and June will actually increase the On-level Factor closer to one.

Part c.
Policies written in 2004 at rate level 1.00, but earned in 2005 (as % of 2005 total earned):

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2004</td>
<td>0.05(0.5/12) = 0.0021</td>
<td></td>
</tr>
<tr>
<td>Feb 2004</td>
<td>0.05(1.5/12) = 0.0063</td>
<td></td>
</tr>
<tr>
<td>Mar 2004</td>
<td>0.05(2.5/12) = 0.0104</td>
<td></td>
</tr>
<tr>
<td>Apr 2004</td>
<td>0.05(3.5/12) = 0.0146</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0.0021+0.0063+0.0104+0.0146=0.0334</td>
<td></td>
</tr>
</tbody>
</table>

Average Rate Level for 2005 = 0.0334(1.00) + .9666(0.92) = 0.9227
Current Rate Level = 0.92
On-level Factor for 2005 = \(\frac{0.92}{0.9227} = 0.9971\)
### QUESTION 29

**Sample Answer**

<table>
<thead>
<tr>
<th>PY</th>
<th>27-39</th>
<th>39-51</th>
<th>51-63</th>
<th>63-75</th>
<th>75-ult</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.080</td>
</tr>
<tr>
<td>00</td>
<td></td>
<td></td>
<td></td>
<td>1.100</td>
<td>1.085</td>
</tr>
<tr>
<td>01</td>
<td></td>
<td>1.200</td>
<td>1.140</td>
<td>1.075</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>1.324</td>
<td>1.153</td>
<td>1.120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>1.280</td>
<td>1.180</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>1.340</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Yr Avg Age-Age</td>
<td>1.315</td>
<td>1.178</td>
<td>1.120</td>
<td>1.080</td>
<td></td>
</tr>
<tr>
<td>Age-Ult</td>
<td>1.967</td>
<td>1.496</td>
<td>1.270</td>
<td>1.134</td>
<td>1.050</td>
</tr>
</tbody>
</table>

2003 Ult Loss – 7,505(1.27) = 9531.35

**Part b.**
Following Graves and Castillo, repeat the 63-75 factor as the 75-ultimate LDF. This assumes that each subsequent link ratio is the square root of the previous.

<table>
<thead>
<tr>
<th>PY</th>
<th>63-75</th>
</tr>
</thead>
<tbody>
<tr>
<td>99</td>
<td>1.101</td>
</tr>
<tr>
<td>00</td>
<td>1.139</td>
</tr>
<tr>
<td>01</td>
<td>1.119</td>
</tr>
</tbody>
</table>

3-Yr Avg = 1.120

Li = 366 + 381 + 503 = 1,250

Z = Li/Li + K = 1,250 / (1,250 + 1,250) = 0.50

63-75 Cred Wtd Link Ratio = 0.50(1.12) + 0.50(1.08) = 1.10
QUESTION 30
Sample Answer
Earned Exposures for Report Year 2002, lag 0

Policy Group #1 = \( \frac{12 \times 12 \times 0.5}{12 \times 12 \times 0.5} \times 1,000 = 1,000.00 \)
Policy Group #2 = \( \frac{9 \times 9 \times 0.5 + 9 \times 3}{12 \times 12 \times 0.5} \times 500 = 468.75 \)

Total Earned Exposures = \( 1,000.00 + 468.75 = 1,468.75 \)

2002 Pure Premium = \( \frac{4,406,250}{1,468.75} = 3,000 \)
2003 Pure Premium = \( 3,000 \times 1.1 = 3,300 \)
2003 Rate = \( \frac{PP + FE}{1 – VE - P} = \frac{3,300 + 100}{1-0.15-0.05} = 4,250 \)

QUESTION 31
Sample Answer
Part a.

<table>
<thead>
<tr>
<th>Claim</th>
<th>Ground-Up 2005</th>
<th>Ground-Up 2006</th>
<th>50x100 2005</th>
<th>50x100 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75,000</td>
<td>82,500</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>100,000</td>
<td>110,000</td>
<td>0</td>
<td>10,000</td>
</tr>
<tr>
<td>3</td>
<td>125,000</td>
<td>137,500</td>
<td>25,000</td>
<td>37,500</td>
</tr>
<tr>
<td>4</td>
<td>150,000</td>
<td>165,000</td>
<td>50,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Total</td>
<td>450,000</td>
<td>495,000</td>
<td>75,000</td>
<td>97,500</td>
</tr>
</tbody>
</table>

Inflation Rate 10.0% 30.0%

Part b.
The excess layer inflation rates are greater than the basic limit inflation rates for two reasons:

1. For losses already in the excess layer, inflation impacts only the portion of the loss in the excess layer. The basic limits portion does not change.
2. For losses near the basic limit, inflation causes the losses to pierce the increased limits layer, resulting in increased frequency of increased limits losses.
QUESTION 32
Sample Answer
Part a.
Policy Year – Group premium and losses based upon policies issued during a given block of time.
Calendar Year – Experience for a give block of time. Premiums = written premium during the period + unearned premium reserve at beginning of period – unearned premium reserve at end of period. Losses = paid losses during period + reserves at end of period – reserves at beginning of period.
Accident Year – Premiums are the same as calendar year. Losses are grouped based upon accidents occurring during the period.

Part b.
Calendar Year data is the most responsive because it is the most mature. Policy year is the least responsive because it is the least mature.

QUESTION 33
Sample Answer
Part a.
Use the 2005 ratio because it is most indicative of the future. Use Written Premium because commission is generally paid at onset of policy.
3,000,000 / 30,000,000 = 10%

Part b.
Use 3-year averages for home office utilities and all other general expense. Use the 2005 ratio for salaries to reflect the new staffing level. Ignore the one-time expense since it is non-recurring. Use earned premium since general expenses are usually incurred throughout the policy period.
Utilities
= (209,000/19,000,000) + (216,000/24,000,000) + (280,000/28,000,000))/3 = 1.0%
All other
= ((190,000/19,000,000) + (240,000/24,000,000) + (280,000/28,000,000))/3 = 1.0%
Salaries
= 1,008,000/28,000,000 = 3.6%
Total
= 1.0%+1.0%+3.6% = 5.6%
QUESTION 34  
Sample Answer

<table>
<thead>
<tr>
<th>Expense Type</th>
<th>Total %</th>
<th>Fixed %</th>
<th>Variable %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commission</td>
<td>15</td>
<td>0.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Other Acquisition</td>
<td>4</td>
<td>3.2</td>
<td>0.8</td>
</tr>
<tr>
<td>General</td>
<td>8</td>
<td>4.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Tax, Lic, Fees</td>
<td>4</td>
<td>0.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Profit and Cont</td>
<td>5</td>
<td>0.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>11.3</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Part a.
Expense Fee Ratio = Fixed / 1 – Variable = 0.113 / (1.000 – 0.267) = 0.154

Part b.
Expense Fee
= Statewide Average Rate x Expense Fee Ratio
= (Loss Cost / ( 1 – Expenses)) x Expense Fee Ratio
= (500 / (1 - 0.38)) x 0.154
= 124.20

QUESTION 35  
Sample Answer

Part a.
ELR=1-V = (1.00-0.25-0.03-0.14-0.05)=0.53
WLR=0.45*0.2+0.65*0.3+0.52*0.5 = 0.545
\[0.545/0.530-1=+2.83\%\]

Part b.
C-factor = 0.53*((1.04*1.02)/1.03)^(15/12)x1.08/1.03] = 0.5766

Part c.
Z=square root ((1.945+2.370+2.260)/10,000) = 0.8109
CLR=0.8109*(0.545)+0.1891*(0.5766) = 0.5510
Indicated Change = 0.551 / 0.53 – 1.00 = +3.96%
QUESTION 36
Sample Answer

Part a.

\[ G = \text{Fixed expense ratio} = \frac{21,000}{300,000} = 7\% \]
\[ V = \text{Premium-related expense factor} = 23\% \]
\[ Q = \text{Profit and Contingencies factor} = 5\% \]
\[ T = \text{Target loss ratio} = \frac{1-V-Q}{1+G} = \frac{(1-23\%-5\%)}{(1+7\%)} = 67.3\% \]
\[ W = \text{Experience loss ratio} = \frac{300,000}{500,000} = 60.0\% \]

Indicated rate level change = \[ \frac{60.0\%}{67.3\%} - 1 = -10.8\% \]

Part b.

\[ P = \text{Pure Premium} = \frac{300,000}{10,000} = 30.0 \]
\[ F = \text{Fixed expenses per exposure unit} = \frac{21,000}{10,000} = 2.1 \]
\[ R = \text{Indicated Rate} = \frac{P+F}{1-V-Q} = \frac{30+2.1}{1-0.23-0.05} = 44.6 \]
\[ \text{Current Rate} = \frac{500,000}{10,000} = 50.0 \]

Indicated Rate Level Change = \[ \frac{44.6}{50.0} - 1 = -10.8\% \]

Part c.
- The loss ratio method is preferable when the exposure unit is not available.
- The loss ratio method is preferable when the exposure unit is not reasonably consistent between risks.
- The pure premium method is preferable for a new line of business.
- The pure premium method is preferable where on-level premium is difficult to calculate.
QUESTION 37
Sample Answer
Expense Constant – Fixed expenses are allocated on a per policy basis rather than on a per exposure basis. This accounts for the fact that certain expenses are incurred no matter how large or how small an insured may be. An expense constant is a fixed amount added to otherwise chargeable premium.
Loss Constant – Small risks tend to have higher loss ratios due to less incentive to reduce costs (due to lower credibility than large risks) and less resources to implement changes to reduce frequency and severity. Loss constants represent an attempt to equalize loss ratios among large and small risks. A loss constant is an addition to otherwise chargeable premium for designated “small” risks.
- OR -
Premium Discounts – similar to loss constants
Experience Rating Plans – similar to loss constants.

QUESTION 38
Sample Answer
Part a.
1 – Homogeneity (relates to similar insured being grouped together) – If you group insured by miles driven, you are in fact putting similar exposures to loss together, so their average loss cost should be similar.
2 – Credibility (having enough data to estimate future costs) – If you segment miles driven into large enough discrete ranges, you should have enough data to accurately estimate future loss costs.
- OR -
3 – Accuracy (variables should be related to costs) – Higher mileage > Higher exposure > Higher costs
4 – Reliability (variables should have predictive stability over time) – Higher mileage and higher costs should have a stable relationship over time.

Part b.
1 - Verifiable/Available (the rating variable is easily available for rating purposes) – “Estimated” miles would need to be audited at end of year and therefore not easily available/verifiable.
2 – Cost Effective (does the increase in accuracy balance the cost of getting data) – Since audits would be required, this variable may not be cost effective.
- OR -
3 – Objective (should be little ambiguity, mutually exclusive and exhaustive classes) – Classes which are mutually exclusive and exhaustive should be easy to derive, and mileage is an objective measure, so mileage is objective.
4 – Related to Costs (should be intuitive relationship to cost) – It is reasonable to expect estimated mileage to be related to costs.
5 – Avoidance of Extreme Discontinuities (rates should change gradually between classes) – This may be difficult at the higher end of the mileage range.
QUESTION 39
Sample Answer

<table>
<thead>
<tr>
<th>Class</th>
<th>Current Relativities</th>
<th>Onlevel Premium</th>
<th>Onlevel Loss and ALAE</th>
<th>Experience Loss and ALAE</th>
<th>Ratio</th>
<th>Indicated Relativities</th>
<th>Adjusted Onlevel Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.000</td>
<td>15,000</td>
<td>15,000</td>
<td>7,500</td>
<td>0.500</td>
<td>1.000</td>
<td>15,000</td>
</tr>
<tr>
<td>2</td>
<td>1.500</td>
<td>10,500</td>
<td>7,000</td>
<td>5,600</td>
<td>0.800</td>
<td>1.600</td>
<td>11,200</td>
</tr>
<tr>
<td>3</td>
<td>2.000</td>
<td>8,000</td>
<td>4,000</td>
<td>4,500</td>
<td>1.125</td>
<td>2.250</td>
<td>9,000</td>
</tr>
<tr>
<td></td>
<td>33,500</td>
<td>26,000</td>
<td>17,600</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- (9) Current Base Rate $250.00
- (10) Indicated Rate Change 1.1200
- (11) Off Balance 0.9517 = (3) Total / (8) Total
- (12) Revised Base Rate $266.48 = (9) x (10) x (11)

QUESTION 40
Sample Answer

1. – Increased incentive for loss control – Since insureds bear more of their own risk, they are more likely to take actions to minimize costs.
2. – Improved cash flows – Insureds are able to hold on to some of their money for longer since they pay a lower premium up front and there will be a lag until losses are reported and paid. Allows for potential investment income which may be greater than the discount the insurer uses in premium calculation.
   - OR -
3. – Insurance Cost Savings – If the insured is a better than average risk for insurers’ rating classifications, the insured may be able to reduce its overall insurance costs.
4. – Reduced Residual Market Burdens – Shifting insureds from a first dollar policy to a large deductible policy reduces the insurer’s premium volume and hence its share of the assigned risk losses.

QUESTION 41
Sample Answer

Part a.
The annual cost excess of a $20,000 deductible prior to managed care is $3\% \times $30,000 + 2\% \times $60,000 = $1,100.

Part b.
The annual cost subsequent to managed care is 2\% \times $60,000 \times 50\% - 2\% \times $20,000 = $200.

Thus the reduction in the expected excess claim cost is \[\frac{$1,100 - $200}{$1,100} = 81.8\%\].
QUESTION 42
Sample Answer

Part a.
First, cap losses at the attachment point and calculate the loss cost:
\[ P_a = \frac{(50,000 + 250,000 + 250,000 + 200,000 + 10,000 + 90,000)}{1,000} = 850 \]
Next, calculate the complement:
\[ \text{Complement} = P_a \times \left( \frac{IL_{a+1}}{IL_a} - 1 \right) = 850 \times (2.5 / 2.0 - 1) = 212.50 \]

Part b.
First, cap losses at 100,000 and calculate the loss cost:
\[ P_d = \frac{(50,000 + 100,000 + 100,000 + 100,000 + 10,000 + 90,000)}{1,000} = 450 \]
Next, calculate the complement:
\[ \text{Complement} = P_d \times \left( \frac{IL_{a+1}}{IL_d} - \frac{IL_a}{IL_d} \right) = 450 \times (2.5 / 1.5 - 2.0 / 1.5) = 150 \]

Part c.
Since there is not much data around the attachment point, the losses in the 0-100K layer may be more reliable than those around the 250K limit. (There are only 3 losses that cross into the layer between 100K and 250K, so the data is too thin in that part of the distribution).

QUESTION 43
Sample Answer

Part a.
It will increase premium volume because those that are not insured to a high enough value will increase their amount of insurance generating additional premiums.
It will decrease premium volume because some risks will be canceled as the reinspections find them ineligible for coverage.

Part b.
It will increase indemnity payments because some of the total or near total losses occurring will result in higher indemnity payments than before the limit was increased.
It will decrease indemnity payments because some insureds will take loss-preventative actions as suggested by the inspectors.
It will also decrease indemnity payments to the extent that there are increased cancellations or non-renewals.
QUESTION 44
Sample Answer

Premium per $100 = \frac{f}{F/100} \left( \sum_{L \leq F} L s(L) + (F[1 - \sum_{L \leq F} s(L)]) \right)

= 20 / 100 ((.5)100000 + (.2)200000 + (.1)300000 + (.2)400000) / (400000/100)

= 1

QUESTION 45
Sample Answer
1 – Grouping multiple states together into territories may mask the true hurricane exposure of one state.
2 – Hurricane exposure is much greater on the coast than inland. Coastal exposures will be undercharged and inland exposures will be overcharged.
3 – Since hurricane losses occur with low frequency, a single storm may be skewing the overall expected loss cost.
4 – Exposure to hurricane loss changes over time with building codes, distribution of policyholders geographically, inflation on home values, etc. Past hurricane losses are not predictive of the future losses, even if the same storm hit the same area today.
- OR -
5 – Not enough historical insurance data, since the period for which insurance data is available has had fewer hurricanes than previously was the case.
QUESTION 46
Sample Answer

First, calculate total projected base class loss cost

<table>
<thead>
<tr>
<th>(1) Rating Territory</th>
<th>(2) Projected Experience Non-Hurricane Base Class Loss Cost</th>
<th>(3) Credibility</th>
<th>(4) Credibility Weighted Non-Hurricane Base Class Loss Cost</th>
<th>(5) Modeled Hurricane Base Class Loss Cost</th>
<th>(6) Total Base Class Loss Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>580.00</td>
<td>0.50</td>
<td>514.64</td>
<td>50.00</td>
<td>564.64</td>
</tr>
<tr>
<td>B</td>
<td>750.00</td>
<td>0.20</td>
<td>534.47</td>
<td>140.00</td>
<td>674.47</td>
</tr>
<tr>
<td>C</td>
<td>448.00</td>
<td>0.20</td>
<td>583.06</td>
<td>54.00</td>
<td>637.06</td>
</tr>
<tr>
<td>Statewide</td>
<td>579.73</td>
<td></td>
<td>534.32</td>
<td>67.22</td>
<td>601.54</td>
</tr>
</tbody>
</table>

(4) = [Column (3) times Column (2)] + [(1-Column (3)) * SW of Column 2 * Non-Hurricane Rel to SW in Current Base Class Loss Cost)]
(6) = Column (4) + Column (5)

Next, calculate the indicated relative change

<table>
<thead>
<tr>
<th>(1) Rating Territory</th>
<th>(7) Relativity of Territory in Column (6) to Statewide Column (6)</th>
<th>(8) Relativity to Statewide of Current Base Class Loss Cost</th>
<th>(9) Indicated Relative Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.939</td>
<td>0.82</td>
<td>1.145</td>
</tr>
<tr>
<td>B</td>
<td>1.121</td>
<td>0.95</td>
<td>1.180</td>
</tr>
<tr>
<td>C</td>
<td>1.059</td>
<td>1.50</td>
<td>0.706</td>
</tr>
<tr>
<td>Statewide</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(9) = COLUMN (7) / COLUMN (8)

QUESTION 47
Sample Answer

1 – Business use – insurers without a credible data source (low volume, new business, etc) may use aggregate insurance data to develop rates, relativities, mod factors, etc.
2 – Regulatory use – regulators use aggregate data to determine overall rate level, market conduct, financial solvency, etc.
QUESTION 48
Sample Answer
1 – Workers Comp Statistical Plan (WCSP) – Collects policy level premiums and losses by class. Used to calculate class relativities and experience modification factors.
2 – Annual Financial Call Data – Collects aggregate premiums and losses. Used to calculate overall loss costs and perform rate level analysis.
3 – Detailed Claim Information (DCI) – Collects detailed information (785 variables). Used for special analysis and research.
- OR –
4 – Policy Issue Capture System Data – Policy level documents submitted by insurers used to confirm proof of workers’ compensation insurance
5 – Residual Market Data – Aggregate policy year premiums, losses, and expenses submitted by servicing carriers used for pool financial reporting.

QUESTION 49
Sample Answer
Develop MSL Limited Losses and ALAE

<table>
<thead>
<tr>
<th>Claim</th>
<th>Unlimited Loss</th>
<th>100K Limited Loss</th>
<th>Unlimited ALAE</th>
<th>150K MSL Capped Loss and ALAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,000</td>
<td>1,000</td>
<td>+</td>
<td>200</td>
</tr>
<tr>
<td>2</td>
<td>1,500</td>
<td>1,500</td>
<td>+</td>
<td>200</td>
</tr>
<tr>
<td>3</td>
<td>5,000</td>
<td>5,000</td>
<td>+</td>
<td>800</td>
</tr>
<tr>
<td>4</td>
<td>6,000</td>
<td>6,000</td>
<td>+</td>
<td>1,000</td>
</tr>
<tr>
<td>5</td>
<td>12,000</td>
<td>12,000</td>
<td>+</td>
<td>1,800</td>
</tr>
<tr>
<td>6</td>
<td>23,000</td>
<td>23,000</td>
<td>+</td>
<td>2,200</td>
</tr>
<tr>
<td>7</td>
<td>120,000</td>
<td>100,000</td>
<td>+</td>
<td>40,000</td>
</tr>
</tbody>
</table>

Total 194,700

Actual Experience Ratio = AER = (Reported + Unreported) / Company Subject BL Loss and ALAE
= (194,700 + 45,000) / 250,000 = 0.9588

Expected Experience Ratio = EER = 0.9

Experience (Credit)/Debit = (AER – EER)/EER x Z = (0.9588 – 0.9)/0.9 x 0.6 = 0.0392
QUESTION 50
Sample Answer

Assume persistency rates given are for that year only, and are not cumulative persistency rates.

### WITHOUT DISCOUNT

<table>
<thead>
<tr>
<th>Year</th>
<th>Prem</th>
<th>PV of Losses</th>
<th>Var Exp</th>
<th>Fix Exp</th>
<th>Fix Pers</th>
<th>Cum Pers</th>
<th>Profit</th>
<th>Disc Fact</th>
<th>PV of Profit</th>
<th>PV of Prem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>800</td>
<td>500</td>
<td>160.00</td>
<td>40.00</td>
<td>100%</td>
<td>100%</td>
<td>100.00</td>
<td>1.00</td>
<td>100.00</td>
<td>800.00</td>
</tr>
<tr>
<td>2</td>
<td>840.00</td>
<td>519.80</td>
<td>168.00</td>
<td>42.00</td>
<td>90%</td>
<td>90%</td>
<td>99.18</td>
<td>1.10</td>
<td>90.16</td>
<td>687.27</td>
</tr>
<tr>
<td>3</td>
<td>882.00</td>
<td>540.39</td>
<td>176.40</td>
<td>44.00</td>
<td>85%</td>
<td>77%</td>
<td>92.73</td>
<td>1.21</td>
<td>76.63</td>
<td>557.63</td>
</tr>
</tbody>
</table>

**Total** 266.80 2,044.90
**Return** 13.0%

### WITH DISCOUNT

<table>
<thead>
<tr>
<th>Year</th>
<th>Prem</th>
<th>PV of Losses</th>
<th>Var Exp</th>
<th>Fix Exp</th>
<th>Fix Pers</th>
<th>Cum Pers</th>
<th>Profit</th>
<th>Disc Fact</th>
<th>PV of Profit</th>
<th>PV of Prem</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>760</td>
<td>500</td>
<td>152.00</td>
<td>40.00</td>
<td>100%</td>
<td>100%</td>
<td>68.00</td>
<td>1.00</td>
<td>68.00</td>
<td>760.00</td>
</tr>
<tr>
<td>2</td>
<td>798.00</td>
<td>519.80</td>
<td>159.60</td>
<td>42.00</td>
<td>98%</td>
<td>98%</td>
<td>75.07</td>
<td>1.10</td>
<td>68.24</td>
<td>710.95</td>
</tr>
<tr>
<td>3</td>
<td>837.90</td>
<td>540.39</td>
<td>167.58</td>
<td>44.00</td>
<td>95%</td>
<td>93%</td>
<td>80.00</td>
<td>1.21</td>
<td>66.12</td>
<td>644.70</td>
</tr>
</tbody>
</table>

**Total** 202.36 2,115.64
**Return** 9.6%

The more profitable solution is to not offer a discount. For this cohort over a three-year period, the return on premium without the discount is 13.0%, and the return on premium with the discount is only 9.6%.