SOCIETY OF ACTUARIES
Introduction to Ratemaking & Reserving

Exam GIIRR

AFTERNOON SESSION

Date: Wednesday, April 29, 2015
Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 8 questions numbered 13 through 20 for a total of 40 points. The points for each question are indicated at the beginning of the question.

2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.

3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.

2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.

3. The answer should be confined to the question as set.

4. When you are asked to calculate, show all your work including any applicable formulas.

5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets since they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam GIIRR.

6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.

13. (*4 points*) You are given the following information on the only three policies that EWF Insurance has written:

Policy	Policy Term	Written Premium	Effective Date	Expiration Date
1	12 months	1,200	March 1, 2013	Feb 28, 2014
2	24 months	1,800	July 1, 2013	June 30, 2015
3	6 months	900	Sept 1, 2013	Feb 28, 2014

- EWF Insurance records written premium in the year of the initial effective date.
- All premiums were increased by 10% for policies written on or after August 1, 2013.
- No other rate changes have occurred since August 1, 2013.
- No policies were renewed at expiration.

(a) (*2 points*) Calculate the unearned premium as of:

(i) December 31, 2013

(ii) December 31, 2014

(b) (*1 point*) Calculate the premium on-level factor to adjust the 2013 calendar year earned premium to the current rate level.

(c) (*1 point*) Explain why the premium for aggregate stop loss coverage is typically not earned evenly throughout a calendar year.

14. (*7 points*)

    (a)   (*1 point*) State the key assumption from the expected method that is used when applying the Bornhuetter Ferguson method.

    (b)   (*1 point*) Explain the difference between the inputs to the Bornhuetter Ferguson method and the inputs to the Benktander method.

    (c)   (*1 point*) Compare the expected claims that are used for the Bornhuetter Ferguson method with the expected claims that are used for the Cape Cod method.

You are given the following information:

Accident Year	Earned Exposures	Paid Claims	Paid Cumulative Development Factors
2012	200	94,260	1.37
2013	210	67,960	2.50
2014	219	30,000	6.25

The annual claim trend is 3%.

    (d)   (*2.5 points*) Calculate the total expected claims using the Cape Cod method.

You are estimating ultimate claims using the Generalized Cape Cod method with a decay factor of 80% and the following information:

Accident Year	Used-Up On-Level Earned Premium	Adjusted Claims	Claim Ratios
2012	100,000	80,000	80.0%
2013	70,000	52,500	75.0%
2014	30,000	27,000	90.0%

    (e)   (*1.5 points*) Calculate the 2014 expected claim ratio using the Generalized Cape Cod method.

15. (*5 points*) You are reviewing the estimates of ultimate claims for a line of business where conditions have been changing.

    (a)   (*1 point*) Explain how the expected claims in each of the Bornhuetter Ferguson and Cape Cod methods responds to deterioration in claims experience.

    (b)   (*1 point*) Explain whether the Bornhuetter Ferguson method or Cape Cod method is more responsive to a deterioration in claims experience.

The following three projection methods are being applied with no special data adjustments:

- Expected method from last year's pricing analysis
- Reported development method using 5-year simple average
- Reported Cape Cod method using 5-year simple average

    (c)   (*1 point*) Explain which projection method is likely to produce the most accurate estimate of ultimate claims if there is an unforeseen and unquantified increase in case reserve adequacy in recent years.

In reviewing claims experience in an accident year triangle, changing conditions can cause patterns to change on an accident year basis (from row to row), or on a calendar year basis (from one diagonal to another).

    (d)   (*1 point*) Explain whether a change in policy exclusions is more likely to cause patterns to change on an accident or a calendar year basis.

    (e)   (*1 point*) Explain whether a change in loss trend is more likely to cause patterns to change on an accident or a calendar year basis.

16. (*4 points*) In 1996, the California Earthquake Authority (CEA) articulated the following four factors that must be considered in rate setting:

1. Location of the insured property and its proximity to earthquake faults, and to other geological factors that affect the risk of earthquakes or damage from earthquakes
2. Soil type on which the insured dwelling is built
3. Construction type and features of the insured dwelling
4. Age of the insured dwelling

A catastrophe model has four modules: Hazard, Inventory, Vulnerability, and Loss.

(a) (*2 points*) Indicate, for each of the four factors listed by the CEA, which module or modules use that particular factor. Support your selections.

The CEA may select factors beyond the four listed above.

(b) (*2 points*) Propose two additional factors that might be considered. Support your proposal.

17. (*4 points*) You are provided with the following information as of December 31, 2014 for a policy year 2014 general liability book of business which began on January 1, 2014:

Net Written Premium	1,000,000
Net Earned Premium	500,000
Selected Net Ultimate Claims Ratio	80%

- The selected policy year premium development factor at 12 months is 1.04.
- The selected net ultimate claims ratio includes ALAE.
- ULAE is 15% of net claims including ALAE.
- The general expense ratio is 20% of net premium. The proportion of general expense applicable to net unearned premium is 30%.
- The cost of reinsurance will increase for all earned premium on or after January 1, 2015. The increase will be 3% of net earned premium.
- Assume zero investment income.

(a)   (*1 point*) Calculate net unearned premium as of December 31, 2014.

(b)   (*2 points*) Calculate net premium liabilities as of December 31, 2014.

(c)   (*0.5 points*) Determine the net premium deficiency reserve, or net equity in unearned premium, at December 31, 2014, labeling your answer as a premium deficiency or equity in unearned premium, as applicable.

(d)   (*0.5 points*) Explain the purpose of a premium deficiency reserve.

18. (*5 points*)

    (a)   (*1 point*) State either one advantage or one disadvantage of claims-made coverage compared to occurrence coverage for each of the following perspectives:

        (i)   Insurer

        (ii)   Insured

    (b)   (*1 point*) Demonstrate with a numerical example a situation in which the claims-made loss cost is greater than the occurrence loss cost.

ABC Insurance Company writes claims-made coverage with a 4-year reporting pattern where 25% of the claims incurred in an accident year are reported in the year of occurrence, and 25% are reported in each of the next three years. The annual report year pure premium trend is 0%.

    (c)   (*2 points*) Calculate tail factors for a claims-made policy for the following maturities:

        (i)   First-year
        (ii)   Second-year
        (iii)   Third-year
        (iv)   Mature

    (d)   (*1 point*) Determine the earned premium in 2015, 2016 and 2017 for a mature tail policy effective January 1, 2015 with a premium of 15,000.

19. (*7 points*)

    (a)   (*1.5 points*) Describe three desirable attributes of a risk classification system.

You are given the following information from Carey Auto Insurer:

- The full credibility standard is 4,329 ultimate counts.
- The square root rule is used for partial credibility.
- The first complement of credibility is the industry relativity with the balance of credibility assigned to the existing relativity.

Territory	Calendar Year 2014 Written Exposures	Weighted Average Trended Ultimate Pure Premium	Ultimate Counts	Industry Relativities	Industry Credibility	Existing Relativities
A	15,500	150	1,171	1.009	80%	0.850
B	8,900	110	530	1.316	60%	1.320
C	8,600	130	364	0.658	50%	0.850
Total	33,000			1.000		

    (b)   (*4 points*) Calculate the relativities to base Territory B using the pure premium approach.

    (c)   (*1.5 points*) Recommend three approaches to increase the stability of risk class relativities.

20. (*4 points*)

(a) (*1 point*) Describe the difference between large claims and catastrophe claims.

You are given the following information for a ratemaking analysis of a property insurance line of business in State X:

Accident Year	Earned House Years	Hail Ultimate Claims
2010	14,212	111,000
2011	14,356	0
2012	14,501	0
2013	14,533	0
2014	14,850	550,000

- New rates are to be effective June 1, 2015 for one year, with all policies written as twelve-month policies.
- The annual severity trend is 7%.
- The annual frequency trend is 0%.
- The 2014 trended earned premium at current level is 10,335,000.

(b) (*2 points*) Calculate the hail loading for State X expressed as a claim ratio.

State X is a small geographical area with 15% of the company's earned exposure. State Y, adjacent to State X, is a much larger geographical area with 85% of the company's exposure, twice the experience years and a catastrophe hail loading of 3.6%. A hail simulation model based on non-insured data suggests a loading of 3.4% for State X and 3.5% for State Y.

(c) (*1 point*) Recommend the catastrophe hail loading for State X. Justify your answer.

END OF EXAMINATION
Afternoon Session

USE THIS PAGE FOR YOUR SCRATCH WORK

USE THIS PAGE FOR YOUR SCRATCH WORK