SOCIETY OF ACTUARIES

Ratemaking & Reserving

Exam GIRR

AFTERNOON SESSION

Date: Wednesday, May 1, 2019
Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 8 questions numbered 14 through 21 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 GIRR.

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

Recognized by the Canadian Institute of Actuaries.

Tournez le cahier d'examen pour la version française.

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Exam GIRR-Front Cover

****BEGINNING OF EXAMINATION****
Afternoon Session

14. (*4 points*) You are conducting a premium trend analysis of a liability line of business for ratemaking purposes.

(a) (*0.5 points*) Explain an advantage of using written premiums over earned premiums for premium trend analysis.

(b) (*0.5 points*) Describe an alternative to using annual written premiums that will improve the responsiveness of the premium trend statistic.

The following historical information is provided:

Experience Period	Percent Earned Exposures by Policy Limits		
	750,000	**1,000,000**	**1,500,000**
2015	30%	40%	30%
2016	27%	40%	33%
2017	23%	40%	37%
Current Increased Limit Factors	0.90	1.00	1.15

Interest in the higher limit is expected to continue to grow due to increasing litigation.

(c) (*1 point*) Calculate the annual trend due to the shift in policy limits for each year.

(d) (*0.5 points*) Recommend the annual trend due to the shift in policy limits to use for ratemaking.

You are given the following additional information:

- Rates will be effective July 1, 2019 for one year
- 50% of all written policies are six-month policies and 50% are twelve-month policies

(e) (*1.5 points*) Calculate the trend factor to be used for 2016 earned premium using the annual trend selected in part (d).

15. (*4 points*) The expected method is frequently used to project ultimate claims for immature experience periods.

(a) (*0.5 point*) Describe two other situations where the expected method may be preferred over the development method when projecting ultimate claims.

Your company is estimating ultimate allocated loss adjustment expenses (ALAE) as of December 31, 2018 for a workers compensation book of business. You are given the following information as of December 31, 2018.

Accident Year	Payroll In Hundreds	Ultimate ALAE from Development Method
2014	155,000	3,900
2015	161,000	8,000
2016	168,000	4,500
2017	172,000	5,000
Total	**656,000**	**21,400**

- The annual payroll trend is 3%.
- The annual ALAE trend is 3%.
- Accident year 2015 includes a claim with exceptionally high ALAE.
- The company switched law firms in late 2015, reducing attorney fees approximately 5% for new claims on or after January 1, 2016.
- A new law reduced workers compensation benefit levels by 6% for new claims on or after January 1, 2017.
- Accident year 2018 payroll in hundreds is 177,000.

(b) (*2 points*) Estimate ultimate ALAE for accident year 2018 using the expected method.

You are given the following additional information:

Accident Year	Paid ALAE as of Dec. 31, 2017	Unpaid ALAE as of Dec. 31, 2017	Paid ALAE as of Dec. 31, 2018
2014–2017	3,780	17,520	7,950
2018	n/a	n/a	260
Total	**3,780**	**17,520**	**8,210**

(c) (*1.5 points*) Calculate the calendar year 2018 incurred ALAE.

16. (*4 points*) You are given the following information for a line of business that started in 2016:

Accident Year	Reported Claims (000)		
	12	24	36
2016	2,000	3,450	4,470
2017	2,350	3,990	
2018	2,580		

Accident Year	Paid Claims (000)		
	12	24	36
2016	1,020	2,010	3,450
2017	1,150	2,260	
2018	1,320		

Accident Year	Case Estimates (000)		
	12	24	36
2016	980	1,440	1,020
2017	1,100	1,620	
2018	1,260		

(a) (*1 point*) Reconcile the data to identify any potential issues.

(b) (*0.5 points*) State two possible causes for data issues.

You are provided with the following additional transactions from a single claim that occurred on June 1, 2016 and was not included in the above data:

	Transaction Description	Transaction Date	Case Estimate	Indemnity Payment	ALAE Payment
1	Open new claim file	Feb. 1, 2017	25,000	0	0
2	Payment on reported claim file	Oct. 1, 2017	20,000	7,000	2,000

(c) (*1.5 points*) Construct revised paid claims and case estimates triangles incorporating this additional information.

(d) (*1 point*) Calculate the calendar year 2018 reported claims using the revised triangles from part (c).

17. (*7 points*) You are estimating ultimate claims for SANT Insurance Company. Your reserving software produces the following preliminary estimates based on age-to-age development factors.

Accident Year	Reported Claims			Ultimate Claims
	12	24	36	
2016	17,600	23,400	29,300	29,300
2017	18,800	23,500		31,300
2018	16,400			24,700

Accident Year	Paid Claims			Ultimate Claims
	12	24	36	
2016	11,700	14,700	26,400	29,300
2017	12,500	15,700		31,300
2018	9,900			24,700

Accident Year	Reported Counts			Ultimate Counts
	12	24	36	
2016	176	234	293	293
2017	181	241		302
2018	186			310

Accident Year	Closed Counts			Ultimate Counts
	12	24	36	
2016	123	188	264	293
2017	126	166		259
2018	109			242

- The expected annual severity trend for SANT Insurance is 4%.
- There is no reported development after 36 months.
- Ultimate estimates shown above are based on simple development methods.

17. Continued

While the underlying business has been stable, new claims processing and settlement policies were introduced in 2018.

(a) (*1 point*) Calculate the average case estimate triangle.

(b) (*0.5 points*) Explain whether the average case estimate triangle indicates reducing, stable or increasing case reserve adequacy.

(c) (*1 point*) Calculate the disposal ratio triangle.

(d) (*0.5 points*) Explain whether the disposal ratio triangle indicates reducing, stable or increasing claim settlement rates.

You have decided to use Berquist-Sherman adjustments to allow for both changes in the adequacy of case estimates and changes in the claim settlement rates.

(e) (*0.5 points*) State the general requirement for meaningful application of Berquist-Sherman adjustments.

Your analysis indicates that there is a simple relationship between cumulative paid claims and cumulative closed counts for all accident and development years. The ratio of cumulative paid claims to cumulative closed counts is 100.

(f) (*1.5 points*) Calculate the adjusted paid claims triangle.

(g) (*2 points*) Calculate the adjusted reported claims triangle.

18. (*4 points*)

(a) (*0.5 points*) Describe the purpose of risk classification systems as used by general insurers.

(b) (*0.5 points*) Describe risk characteristics within a risk classification system.

Ignoring the differences in risk characteristics can result in pricing inaccuracies.

(c) (*1 point*) Describe a potential consequence of these pricing inaccuracies from the perspective of each of the following:

(i) The insured

(ii) The insurer

(d) (*0.5 points*) Explain why a risk classification system is not intended to predict costs for an individual risk in the class.

Credit score is an example of a risk characteristic that has been shown to exhibit correlation to expected costs for automobile coverage. U.S. Standards on risk classification require several considerations.

(e) (*0.5 points*) Describe a consideration that may be difficult for insurers to demonstrate when using credit scores as a risk characteristic.

ABC Insurance Company currently charges insureds based on actual pure premium which varies significantly based on credit class. ABC Insurance Company decides to discontinue use of credit as a risk characteristic due to potential public relations concerns.

(f) (*0.5 points*) Describe a potential rate impact to ABC Insurance Company's high and low risk insureds resulting from this change.

(g) (*0.5 points*) Explain why the decision for ABC Insurance Company will lead to adverse selection and reduced profits.

19. (*6 points*) Insurers often use deductibles to eliminate the processing costs associated with small claims.

(a) (*0.5 points*) Provide two other reasons insurers rely on deductibles.

A property valued at 500,000 experiences a loss for the full amount of the property.

(b) (*2 points*) Calculate losses retained by the insured and the claims paid by the insurer under the following deductible options.

(i) A percentage deductible of 10% with coverage of 500,000

(ii) A percentage deductible of 10% with coverage of 400,000

(iii) A franchise deductible of 50,000

(iv) A disappearing deductible with a stated value of 10,000, with a provision that losses five times the stated value will be paid in full

(c) (*0.5 points*) Provide a reason why an insured with a policy with a percentage deductible might purchase coverage for less than the full value of a property.

(d) (*0.5 points*) Provide a reason why an insurer might prefer to offer a percentage deductible rather than a straight deductible for property coverage.

An insured with an automobile collision policy is considering increasing their deductible.

(e) (*1 point*) Explain the expected impact on an insurer's claim frequency and severity from this increase.

The premium rate for this automobile collision policy with a 500 deductible is 400 and the premium rate with a 1,000 deductible is 300.

(f) (*1.5 points*) Propose a reasonable premium rate for this policy with a 1,500 deductible. Justify your answer.

20. (*6 points*) Historical reported claims may not be appropriate for use in a traditional development-based projection method.

(a) (*2 points*) Recommend a separate approach to address each of the following issues. Justify your recommendation.

(i) Change in claim settlement pattern

(ii) Activity observed to-date is not predictive of future activity

You are preparing to review a medium-tailed line of business (no development after 10 years) with stable exposures and minimal claim volatility. However, the claim ratios have been deteriorating in the last three accident years.

All the necessary data is available for your review including 15 years of historical experience. The development method is a reasonable approach except for the most recent accident year.

You decide to use the Generalized Cape Cod method to estimate ultimate claims for the most recent accident year.

(b) (*0.5 points*) Recommend the number of accident years you would use for the experience period. Justify your recommendation.

(c) (*0.5 points*) Recommend the decay factor you would use. Justify your recommendation.

You are estimating unpaid claim liabilities for a different line of business as of December 31, 2018 and are given the following information:

Accident Year	Earned Exposures	Paid Claims (000)	Reported Claims (000)	Expected % Reported
2016	700	70	90	100.0%
2017	800	50	80	90.9%
2018	900	30	60	66.7%

- The annual pure premium trend is 2%.
- Tort reform resulted in an estimated claim decrease of 10% for all accidents occurring on or after January 1, 2018.

(d) (*3 points*) Calculate unpaid claim liabilities for all accident years using the Generalized Cape Cod method and a decay factor of 100%.

21. (*5 points*) You are estimating ultimate claims for a line of business that has seasonality. You are given the following information as of December 31, 2018:

Accident	Reported Claims				
Half-Year	6	12	18	24	30
2015-1	13,200	12,804	14,853	16,190	16,352
2015-2	12,700	13,081	15,436	16,671	17,004
2016-1	13,600	12,920	15,116	16,174	16,336
2016-2	13,100	13,362	16,034	16,836	17,173
2017-1	14,200	13,916	16,421	17,406	
2017-2	13,900	14,317	17,037		
2018-1	14,600	13,724			
2018-2	14,200				

Accident	Age-to-Age Factors				
Half-Year	6-12	12-18	18-24	24-30	30-Ult
2015-1	0.970	1.160	1.090	1.010	1.000
2015-2	1.030	1.180	1.080	1.020	1.000
2016-1	0.950	1.170	1.070	1.020	1.000
2016-2	1.020	1.200	1.050	1.010	
2017-1	0.980	1.180	1.060		
2017-2	1.030	1.190			
2018-1	0.940				

(a) (*2.5 points*) Calculate the ultimate claims for accident year 2018 using the development method. Justify your selections.

(b) (*1.5 points*) Calculate the accident year 2018 expected reported claims from December 31, 2018 to March 31, 2019 using your recommendations from part (a) and linear interpolation.

(c) (*1 point*) Calculate the accident year 2018 expected reported claims from December 31, 2018 to June 30, 2019.

****END OF EXAMINATION****
Afternoon Session

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