SOCIETY OF ACTUARIES

General Insurance
Ratemaking and Reserving

Exam GI 101

Date: Monday, March 23, 2026

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 11 questions numbered through 11 with a total of 50 points.

   The points for each question are indicated at the beginning of the question.

2. 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 provided in this document.

Written-Answer Instructions

1. Each question should be answered in the Excel file. Graders will only look at work in the Excel file.

2. Calculations should be done in Excel and entered as formulas. Performing calculations on scratch paper or with a calculator and then entering the answer in the cell will not earn full credit. Formatting of cells or rounding is not required for credit. Rows can be inserted to the answer input area as required to provide space for your answer.

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

3. Prior to uploading your Excel file, the file should be saved and renamed with your unique candidate number in the filename.

4. The Excel file that contains your answers must be uploaded before the five-minute upload period expires.

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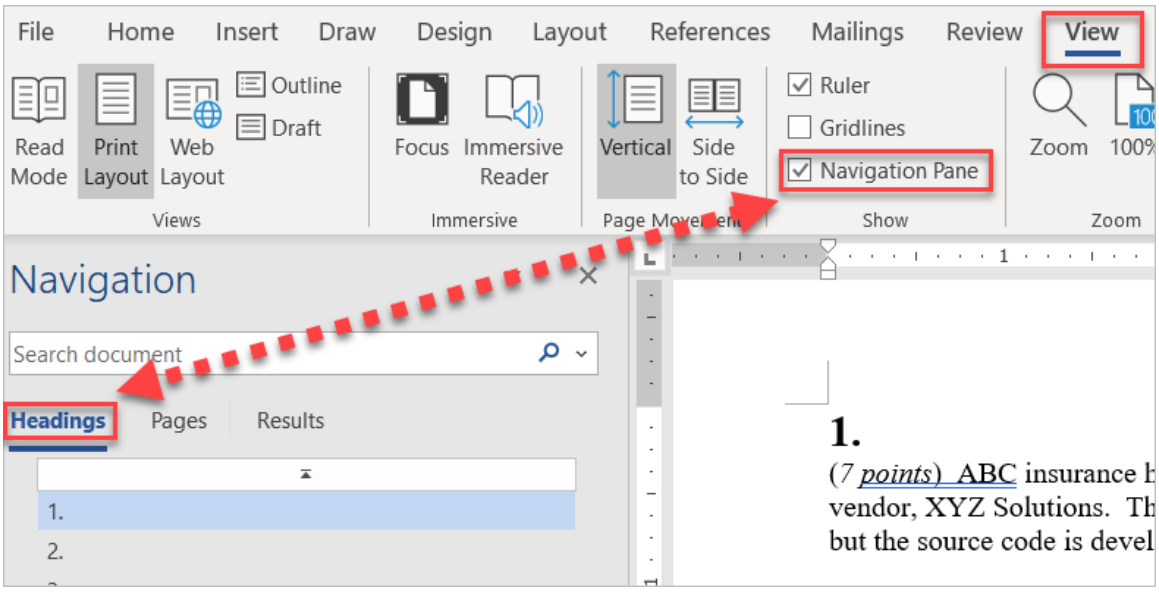
Navigation Instructions

Open the Navigation Pane to jump to questions.

Press Ctrl+F, or click View > Navigation Pane:



1.

Provide the response for this question in the Excel spreadsheet.

(*4 points*) You are conducting a ratemaking exercise for a line of business.

(a) (*0.5 points*) Define contingency margins.

You are using a pure premium approach to ratemaking.

(b) (*1 point*) Describe two situations where the pure premium approach might be preferred to the claim ratio approach.

(c) (*0.5 points*) Describe how the fixed expense provision is calculated when you are given the fixed expenses to premium ratio.

You are given:

- All claim costs, including ULAE, are 1,000 per exposure.
- Fixed expenses are 50 per exposure.
- Variable expenses are 5% of premium.
- The underwriting profit and contingency margin provision is 3% of premium.
- The full credibility standard using classical credibility is 1,082 counts.
- The total counts in the experience period are 600.
- The indicated rate change with full credibility is an increase of 7%.

(d) (*2 points*) Calculate the indicated rate using partial credibility.

2.

Provide the response for this question in the Excel spreadsheet.

(*4 points*) You are given:

Accident Year (AY)	Reported Claims				
	12	**24**	**36**	**48**	**60**
2021	400,558	603,545	779,688	852,668	881,497
2022	418,143	626,463	812,172	893,525	
2023	441,674	859,929	1,053,725		
2024	465,005	698,840			
2025	489,816				

- A large claim occurred on December 15, 2023.
- A case estimate of 200,000 was established for the large claim on January 10, 2024 and has not changed.
- No payments have been made on the large claim as of December 31, 2025.

(a) (*0.5 points*) Describe the effect of the large claim on the AY 2023 reported development factors.

(b) (*2.5 points*) Calculate the IBNR for AY 2023 as of December 31, 2025.

(c) (*1 point*) Provide one scenario where estimating the IBNR for accident year 2023 using a paid claims development method might not be an appropriate alternative.

3.

Provide the response for this question in the Excel spreadsheet.

(*4.5 points*) You are using the Mango and Allen smoothing adjustment to estimate unpaid unallocated loss adjustment expenses (ULAE) as of December 31, 2025 for a line of business. You are given:

Report Year	Earned Exposures	Estimated Ultimate Claims
2020	4,486	4,148,980
2021	4,719	4,615,322
2022	4,777	5,195342
2023	4,885	5,678,556
2024	4,998	6,405,964
2025	5,221	7,265,714

Maturity Age in Months	Reported Age-to Ultimate Development Factors
12	2.565
24	1.582
36	1.187
48	1.068
60	1.000

Calendar Year	Paid ULAE	Expected Paid Claims	Expected Reported Claims
2022	362,500	4,475,312	4,661,511
2023	412,588	4,960,917	5,152,178
2024	467,712	5,529,080	5,663,308
2025	531,305	6,196,672	?

- IBNR as of December 31, 2025 is 6,987,456.
- Case estimates as of December 31, 2025 are 2,979,334.
- Approximately 25% of claim department expenses relate to opening a claim file and 75% relate to maintaining and closing a claim file.

(a) (*1.5 points*) Calculate the calendar year 2025 expected reported claims.

(b) (*1 point*) Recommend a ULAE ratio to use for this line of business using the Kittel refinement with the Mango and Allen smoothing adjustment to the classical paid-to-paid method. Justify your recommendation.

3. Continued

(c) (*1 point*) Calculate unpaid ULAE as of December 31, 2025 using the recommended ratio from part (b).

A more correct application of the paid-to-paid method would require separating the IBNR into pure IBNR and development on case estimates.

(d) (*1 point*) Explain why the calculation in part (c) would overstate the estimate of unpaid ULAE compared to the more correct application of the paid-to-paid method.

4.

Provide the response for this question in the Excel spreadsheet.

(*3 points*) You are evaluating loadings for catastrophes and large claims for a ratemaking analysis.

Catastrophes can often increase claims severity, however, some catastrophes such as a hailstorm can decrease claims severity.

(a) (*0.5 points*) Describe how a hailstorm event could decrease claims severity.

(b) (*1 point*) Provide two reasons why catastrophe claims cause delays in settlement.

(c) (*0.5 points*) Describe a reason to include a loading for large claims when the historical data does not reflect any large claims.

(d) (*1 point*) Describe two approaches to account for the effect of large claims in a ratemaking analysis.

5.

Provide the response for this question in the Excel spreadsheet.

(*4.5 points*) You are given the following for a *homeowners* line of business:

- For policies written or renewed on or after July 1, 2024,
  - 50% of policies are written for 6-month policy terms, and
  - 50% are written for 12-month policy terms.
- The calendar year (CY) 2024 written premiums for all policies written or renewed on or after July 1, 2024 were 340,000.
- All policies are written and earned evenly throughout the policy term.

(a) (*1.5 points*) Calculate the homeowners CY 2024 *earned* premiums for all policies written or renewed on or after July 1, 2024.

You are given the following for an *automobile* line of business:

- CY 2024 earned premiums from 12-month policies were 1,350,000.
- CY 2024 earned premiums from 6-month policies were 840,000.
- The premiums for all policies written on or after September 1, 2024 were increased by 8%.
- There has been no rate change since September 1, 2024.
- All policies are written and earned evenly throughout the policy term.

(b) (*1.5 points*) Calculate the automobile CY 2024 earned premiums at current rate levels for a *ratemaking* analysis.

(c) (*1.5 points*) Calculate the automobile CY 2024 earned premiums at current rate levels for *projecting ultimate claims* as of December 31, 2025.

6.

Provide the response for this question in the Excel spreadsheet.

(*4 points*) You are estimating ultimate claims using a development-based frequency-severity method and are given:

Accident Year	Ultimate Counts from Frequency-Severity Method	Ultimate Claims Based on Development Method
2019	817	13,416,784
2020	829	14,248,777
2021	840	12,522,931
2022	833	11,501,959
2023	841	12,257,595
2024	844	13,264,316
2025	843	14,297,140

- Tort reform decreased claim amounts by an estimated 30% for all claims occurring on or after July 1, 2021.

(a) (*2 points*) Recommend an annual severity trend to use for the frequency-severity method. Justify your recommendation.

(b) (*1 point*) Recommend the 2025 cost level severity to use with the development-based frequency-severity method, using your recommendation from part (a).

(c) (*1 point*) Calculate the ultimate claims as of December 31, 2025 for all accident years using the development-based frequency-severity method.

7.

Provide the response for this question in the Excel spreadsheet.

(*6.5 points*)

(a) (*1 point*) Explain how the Bornhuetter Ferguson method and the Cape Cod method each reflect a change in claim experience.

One advantage of the Generalized Cape Cod (GCC) method over other methods is it can incorporate judgement through the decay factor.

(b) (*1 point*) Describe another advantage the GCC method has over each of the following methods:

(i) the Bornhuetter Ferguson method

(ii) the Cape Cod method

You are given:

2025 earned exposures	13,160
2025 earned premiums at current rate levels	2,340,000
AY 2025 reported claims as of March 31, 2026	875,000
A priori expected claim ratio	66%

Incremental Reporting Pattern	
0 - 12 months	45%
12 - 24 months	35%
24 - 36 months	15%
36 - 48 months	5%

(c) (*1 point*) Compare actual reported claims with expected reported claims as of March 31, 2026.

(d) (*1 point*) Calculate the ultimate pure premiums as of March 31, 2026 for:

(i) the expected method

(ii) the Bornhuetter Ferguson method

(e) (*0.5 points*) Calculate the IBNR reserves as of December 31, 2026 using the Bornhuetter Ferguson method.

7. Continued

You are also given:

Accident Year (AY)	Earned Exposures	Reported Claims as of March 31, 2026
2022	11,648	1,150,000
2023	11,872	1,240,000
2024	12,544	1,280,000
2025	13,160	875,000

The annual pure premium trend is 4%.

(f) (*2 points*) Calculate the AY 2025 ultimate claims as of March 31, 2026 using the Cape Cod method.

8.

Provide the response for this question in the Excel spreadsheet.

(*7.5 points*) XYZ Insurance has acquired a new line of business that started writing policies in 2022. You are given the following as of December 31, 2024:

Accident Year (AY)	Cumulative Paid Claims		
	12	24	36
2022	1,897,000	1,726,000	3,313,000
2023	3,169,000	4,580,000	
2024	3,680,000		

AY	Case Estimates		
	12	24	36
2022	2,135,000	1,033,000	495,000
2023	3,560,000	2,750,000	
2024	4,150,000		

AY	Open Counts		
	12	24	36
2022	980	450	202
2023	1,570	1,152	
2024	1,750		

You are given the following as of October 31, 2025:

AY	Incremental Paid Claims Jan. 1, 2025 through Oct. 31, 2025	Case Estimates as of Oct. 31, 2025	Open Counts as of Oct. 31, 2025
2022	1,250,000	146,000	55
2023	980,000	1,085,000	385
2024	1,540,000	3,275,000	1,350
2025	3,750,000	4,250,000	1,680

8. Continued

During November and December 2025, only the following transactions were recorded:

- A new claim which occurred on June 1, 2024 was reported on November 15, 2025 with an initial case estimate of 250,000. No payments have been made on this claim.
- An open claim from AY 2023 was closed on December 1, 2025 with a final lump sum payment of 50,000. The case estimate as of October 31, 2025 for this claim was 100,000.
- A closed claim from AY 2025 was reopened on November 30, 2025, with a new case estimate of 75,000 and no new payments.

(a) (*2 points*) Calculate the calendar year 2025 reported claims as of December 31, 2025.

The annual claim severity trend in a stable environment is 4%.

(b) (*1 point*) Construct the triangle of average case estimates as of December 31, 2025.

(c) (*0.5 points*) Assess whether the triangle of average case estimates indicates any significant change in case adequacy.

(d) (*1 point*) Construct the triangle of paid to reported ratios as of December 31, 2025.

(e) (*0.5 points*) Assess whether the triangle of paid to reported ratios indicates any significant change in case adequacy.

You have decided to estimate ultimate claims using the development method applied to reported claims, using a Berquist-Sherman adjustment for a change in case adequacy.

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

A colleague has recommended using industry data for development factors instead of development factors determined from the adjusted reported claims in part (f).

(g) (*1 point*) Critique your colleague's recommendation for this line of business by describing one positive aspect and one negative aspect of the recommendation.

9.

Provide the response for this question in the Excel spreadsheet.

(*3.5 points*) You are conducting a premium trend analysis to account for vehicle rate group drift as part of a ratemaking analysis, and are given:

Vehicle Rating Group	Calendar Year Earned Vehicles by Vehicle Rate Group				Current Differentials
	2022	2023	2024	2025	
1	1,702	1,639	1,533	1,437	0.92
2	1,747	1,684	1,634	1,591	0.96
3	1,714	1,711	1,712	1,723	1.00
4	1,758	1,840	1,909	2,020	1.06
5	1,660	1,821	2,030	2,283	1.14
6	1,659	1,985	2,368	2,976	1.21
Total	**10,240**	**10,680**	**11,186**	**12,030**	

(a) (*1.5 points*) Calculate the annual change in premium for each year.

(b) (*1 point*) Recommend an annual premium trend rate to adjust from calendar year 2022 to the future rating period. Justify your recommendation.

You are also given:

- All policies are annual and are written and earned evenly throughout the year.
- Calendar year 2022 earned premiums adjusted to current rate levels are 12,500,000.
- The new rates will be effective for one year on September 1, 2026.

(c) (*1 point*) Calculate the calendar year 2022 earned premiums for ratemaking.

10.

Provide the response for this question in the Excel spreadsheet.

(*3.5 points*)

When estimating unpaid claims, an actuary should consider how changes in policy limits will affect their data and selected projection methods.

State X increased the bodily injury minimum financial responsibility policy limits for auto policies from 25,000 to 50,000 for all policies in force effective January 1, 2025.

(a) (*1 point*) Describe how this policy limit change is likely to affect the following:

(i) Frequency and severity of claim data

(ii) Development pattern for paid claims

(b) (*0.5 points*) Recommend an approach to estimating ultimate claims for accident year 2025.

You are projecting ultimate claims for a long-tailed line of business in an environment with steady-state volume and a material change in claim settlement pattern. Your colleague has suggested using paid data applied to either the Bornhuetter Ferguson method or the Cape Cod method to estimate ultimate claims.

(c) (*1 point*) Explain which of these two methods is a more accurate projection method under this scenario, when no explicit adjustments are made to the method or data. Justify your selection.

You are estimating IBNR for a line of business using various methods to compare the results. Your colleague recommends disregarding the methods that resulted in negative IBNR.

(d) (*1 point*) Critique your colleague's recommendation.

11.

Provide the response for this question in the Excel spreadsheet.

(*5 points*) You are estimating ultimate claims using the expected method.

(a) (*0.5 points*) Explain an advantage of using the pure premium approach instead of the claim ratio approach.

Under certain situations, development factors and trend factors can each have highly leveraged projections.

(b) (*0.5 points*) Describe how development factors can highly leverage projections.

(c) (*0.5 points*) Describe how trend factors can highly leverage projections.

(d) (*1 point*) Describe one way you could account for development leverage and one way you could account for trend leverage when selecting a pure premium with the expected method.

You are given the following for a Workers Compensation line of business:

Accident Year (AY)	Earned Exposures	Cumulative Paid Claims as of Dec. 31, 2025	Reported Claims as of Dec. 31, 2025	Paid Claims Cumulative Development Factors	Reported Claims Cumulative Development Factors
2019	23,378	9,269,896	9,391,874	1.048	1.032
2020	23,579	8,885,445	9,423,176	1.127	1.066
2021	23,665	8,106,189	9,086,519	1.304	1.168
2022	24,095	7,217,780	8,653,058	1.587	1.326
2023	24,437	5,583,814	7,498,246	2.132	1.611
2024	24,978	4,117,247	6,281,172	3.298	2.108
2025	24,973	1,803,097	4,260,964	6.849	3.078

The annual pure premium trend is 5.0%.

(e) (*1 point*) Calculate the 2025 cost level pure premiums for all accident years based on paid claims and also based on reported claims.

11. Continued

(f) (*1 point*) Recommend the 2025 cost level pure premium. Justify your recommendation.

(g) (*0.5 points*) Calculate the AY ***2023*** expected claims using the expected method and the recommended value from part (f).

****END OF EXAMINATION****