Group & Health Finance and Valuation Exam
(2 hour segment)

Exam GHFVA

Date: Monday, November 1, 2021

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 5 questions numbered 1 through 5 with a total of 40 points.

   The points for each question are indicated at the beginning of the question. Question 5 pertains to the Case Study.

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 part or subpart should be answered either in the Word document or the Excel file as directed. Graders will only look at work in the indicated file.

   a) In the Word document, answers should be entered in the box marked ANSWER. The box will expand as lines of text are added. There is no need to use special characters or subscripts (though they may be used). For example, β_1 can be typed as beta_1 (and ^ used to indicate a superscript).

   b) In the Excel document formulas should be entered. 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.

   c) Individual exams may provide additional directions that apply throughout the exam or to individual items.

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

3. Prior to uploading your Word and Excel files, each file should be saved and renamed with your five-digit candidate number in the filename.

4. The Word and Excel files that contain your answers must be uploaded before the five-minute upload period expires.

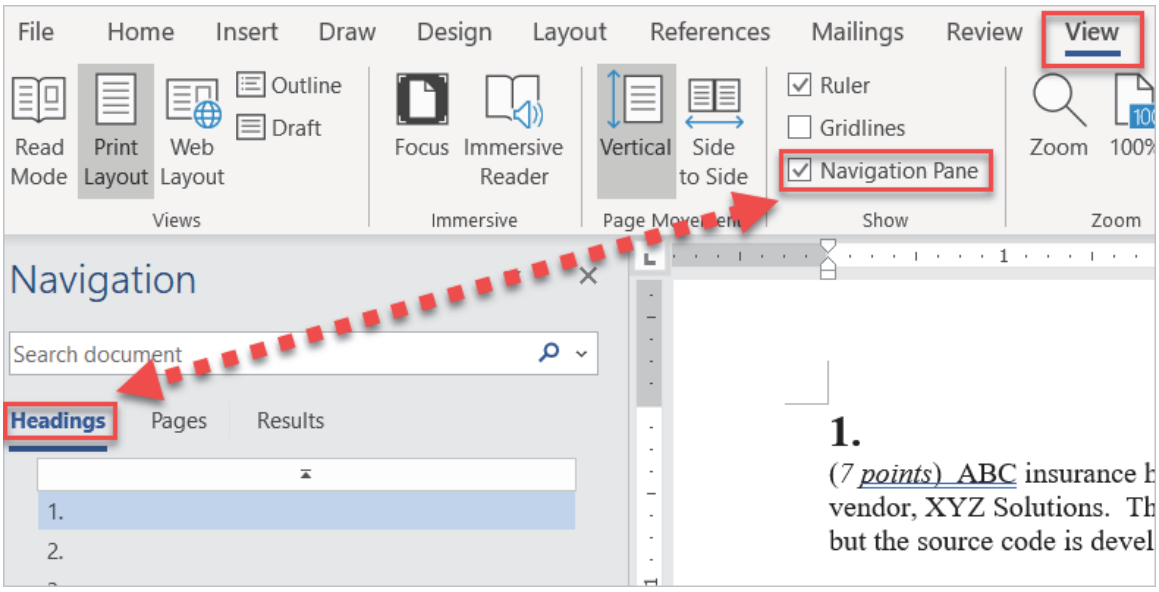
Recognized by the Canadian Institute of Actuaries.

475 N. Martingale Road
Schaumburg, IL 60173-2226

Navigation Instructions

Open the Navigation Pane to jump to questions.

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



CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

1.

(*5 points*) You are the actuary for an individual insurance company.

(a) (*1 point*) Identify and explain the four major categories of reserves.

ANSWER:

You have been asked to review the pricing for individual policies sold on 1/1/21. There were 120 individual policies sold on 1/1/2021 on an issue age basis with the following characteristics:

- Premiums are paid annually at the beginning of the year.
- Claims are paid out at the end of the year.
- Lapses occur at the midpoint of each year.
- Claims in year 1 start at $1,500 and increase annually at 8% thereafter.
- Each year there is an 80% chance that each person will persist except there is a 0% chance each person will persist to Year 5.
- Interest is 2.0% annually.

(b) (*2 points*) Calculate the total net level annual premium for the block. Show your work.

The response for this part is to be provided in the Excel spreadsheet.

(c) (*2 points*) Calculate the total policy reserves for the block at the end of year 2 per policy still in force in year 2. Show your work.

The response for this part is to be provided in the Excel spreadsheet.

2.

(*9 points*)

(a) (*2 points*) List factors the actuary should consider when projecting claims for a Premium Deficiency Reserve ("PDR") calculation.

ANSWER:

Woodford Insurance Company ("Woodford") sells individual Medicare Supplement policies, and the business has experienced significant losses in the last two years. The PDR for Woodford's Medicare Supplement business is $0 for this year end.

(b) (*1 point*) Describe two reasons why a PDR of $0 may be appropriate for Woodford's Medicare Supplement business.

ANSWER:

Bayshore Insurance Company ("Bayshore") insures a five-year group medical contract for which scheduled premium increases were expected to be sufficient to maintain profitability at issue for all five years. Results in the first year were consistent with expectations but now during its second year, Bayshore has updated its claims projections as shown in the following table:

	Annual Results ($000)			
Year	Earned Premiums	Original Claims	Revised Claims	Expenses/ Commissions
1 (actual)	432	360	360	52
2 (expected)	443	371	378	53
3 (expected)	454	382	396	54
4 (expected)	464	392	414	56
5 (expected)	475	403	417	57

(c) (*1 point*) Calculate the PDR at the end of year 2 for the group medical contract given the premium rate increases are guaranteed through year 5 and assume a discount rate of 0%. Show your work.

The response for this part is to be provided in the Excel spreadsheet.

2. Continued

Denmain Insurance Group ("Denmain") acquires this group medical contract from Bayshore during year 2 and intends to terminate it at the end of year 5. You are given the following about Denmain's testing groups for its other lines of business:

Testing Group	Income Statement Original Actual Results for Year 2 ($000)			
	Earned Premium	Incurred Claims	Expenses/ Commissions	Underwriting Gain/Loss
Group Disability	$714	$649	$78	-$13
Group Long-Term Care	$741	$631	$86	$24
Group Dental	$300	$255	$35	$10
Individual Major Medical	$472	$425	$80	-$33
Individual Medicare Supplement	$47	$52	$3	-$8
Totals	$2,274	$2,012	$282	-$20

Testing Group	Projected Underwriting Cash Flows by Year ($000)				
	3	4	5	6	7
Group Disability	-$14	$3	$4	$5	$7
Group Long-Term Care	$19	$22	$21	$23	$25
Group Dental	$13	$10	$9	$6	$5
Individual Major Medical	-$22	$0	$5	Termed	Termed
Individual Medicare Supplement	-$9	-$7	-$5	-$4	$0

(d) (*1 point*) Calculate the PDR at each testing level for the Denmain businesses including the business acquired from Bayshore. Show your work.

The response for this part is to be provided in the Excel spreadsheet.

(e) (*1 point*) Recommend a grouping for the PDR at the reporting level for Denmain including the business acquired from Bayshore. Justify your answer.

ANSWER:

2. Continued

(f) (*1 point*) Calculate the PDR at the reporting level for Denmain including the business acquired from Bayshore using your recommended grouping from (e). Show your work.

The response for this part is to be provided in the Excel spreadsheet.

(g) (*1 point*) Recommend a method to allocate the PDRs from (f) by product for internal reporting purposes. Justify your answer.

ANSWER:

(h) (*1 point*) Calculate the PDR at the reporting level for each product using the method recommended in part (g). Show your work.

The response for this part is to be provided in the Excel spreadsheet.

3.

(*8 points*) You are an actuary on the reserving team at Crisium Insurance. You are provided with the following for the small group and individual medical blocks of business:

Inpatient authorization data (see Excel).

Percentage of authorization data missing:

Incurred Month	1	2	3	4	5	6	7	8	9	10	11	12
Missing Data %	3%	3%	3%	3%	3%	3%	3%	3%	3%	5%	10%	15%

Claims paid and incurred to date ($000s):

Incurred Month	1	2	3	4	5	6	7	8	9	10	11	12
Medical/ Surgical	$909	$1,093	$1,165	$1,137	$1,099	$975	$1,110	$1,164	$935	$897	$781	$774

Cost per day estimates from lag analyses:

Incurred Month	1	2	3	4	5	6	7	8	9	10	11	12
Medical/ Surgical	$930	$1,012	$1,068	$1,083	$1,042	$1,026	$939	$1,081	$969	$1,153	$1,046	$942

Assumed credibility of lag analyses:

Incurred Month	1	2	3	4	5	6	7	8	9	10	11	12
Medical/ Surgical	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	90%	80%

Average contracted cost/day for inpatient claims is $1,100 for months 1-10.
Months 1-10 contracted cost/day has a seasonality factor of 1.0.
Month 11 contracted cost/day has a seasonality factor of 1.05.
Month 12 contracted cost/day has a seasonality factor of 0.95.

(a) (*5 points*) Calculate the total estimated inpatient Incurred But Not Reported (IBNR) reserve as of the end of the year. Show your work.

The response for this part is to be provided in the Excel spreadsheet.

(b) (*1 point*) Describe issues with using authorization reports when estimating an IBNR reserve.

ANSWER:

3. Continued

(c) (*2 points*) Explain four different ways to add conservatism when using authorized days to estimate your IBNR reserve in (a). Justify your answer.

ANSWER:

4.

(*10 points*) You are the consulting actuary for an investment firm interested in investing in a start-up digital insurance company.

(a) (*2 points*)

(i) Describe the objectives of due diligence.

ANSWER:

(ii) Explain why due diligence objectives are so important to the buyer.

ANSWER:

(b) (*4 points*) Describe the role of each of the following functional areas of the due diligence team:

1. Finance
2. Investments
3. Tax
4. Legal & Compliance
5. Marketing & Distribution
6. Systems
7. Human Resources
8. Product Management
9. Claims
10. Reinsurance
11. Risk Management
12. Actuarial

ANSWER:

(c) (*1 point*) Describe uses of the actuarial appraisal report for the buyer.

ANSWER:

4. Continued

The start-up has been in business for five years and focuses primarily on the direct-to-consumer market without the use of agents and brokers.

You are given the following details of the start-up digital insurance company:

	Year 1	Year 2	Year 3	Year 4	Year 5
Premium	12,000,000	12,600,000	13,860,000	17,325,000	21,656,250
Investment Income	54,167	109,620	114,927	131,957	160,822
Paid Claims	8,000,000	8,190,000	8,783,775	10,705,226	13,046,994
Salary Expenses	750,000	825,000	907,500	998,250	1,098,075
Policy Administration Expenses	500,000	525,000	577,500	721,875	902,344
Marketing Expenses	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
IT Expenses	1,000,000	425,000	467,500	514,250	565,675
Reserve Balances					
Claims Opening Balance	-	666,667	682,500	731,981	892,102
Claims Closing Balance	666,667	682,500	731,981	892,102	1,087,249
Statutory Reserve Opening Balance	-	2,166,667	2,218,125	2,378,939	2,899,332
Statutory Reserve Closing Balance	2,166,667	2,218,125	2,378,939	2,899,332	3,533,561

Additional Information:

Risk Free Rate of Return	5%
Market Rate of Return	9%
Measure of Risk of the Digital Insurance Company	2.40
Required Capital (percent of premium)	5%
Corporate Tax Rate	35%

(d) (*3 points*) Calculate the actuarial appraisal value for the digital start-up company. State your assumptions and show your work.

The response for this part is to be provided in the Excel spreadsheet.

Question 5 pertains to the Case Study

5.

(*8 points*) You are a senior actuary for Skyfall and have been asked to do reserve work for the Quantum Legacy III – Individual product.

You are given the following:

- For months that are estimated to be 70% or more complete:
  - Use the age to ultimate method.
  - Utilize September Year 3 incurred data for the age to ultimate factors.

- For months that are estimated to be less than 70% complete:
  - Utilize a PMPM or projection method.
  - Utilize the corresponding month of the prior year for the PMPM or projection method.
  - Use a 7% annual trend assumption for the PMPM method.

(a) (*4 points*) Calculate the incurred but not reported (IBNR) reserve as of September 30, Year 4. Show your work.

The response for this part is to be provided in the Excel spreadsheet.

The Chief Actuary wants you to perform a run-out study of the reserves calculated as of September 30, Year 4, utilizing the data paid through December 31, Year 4.

(b) (*3 points*) Calculate the difference between the original reserve and the revised reserve from the run-out study. Show your work

The response for this part is to be provided in the Excel spreadsheet.

(c) (*1 point*) List considerations of Actuarial Standard of Practice #5 that can be used in estimating incurred claims.

ANSWER:

****END OF EXAMINATION****