

Exam GHFVA

Date: Monday, May 3, 2021

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 7 questions numbered 1 through 7 with a total of 40 points.

The points for each question are indicated at the beginning of the question. Question 4 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 time expires.

Recognized by the Canadian Institute of Actuaries.

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)

- (a) (2 points) List and describe the types of insurer financial statements that use different reserve bases.

ANSWER:

- (b) (1 point) List and describe the types of premium reserves.

ANSWER:

You are given the following policy information, including the latest coverage date through which premium has been paid.

Policy Number	Annual Premium	Premium Mode	Issue Date	Paid-Through Date
001	\$2,400	Monthly	01 Jan 2019	31 Jan 2021
002	\$2,000	Annual	01 Jan 2021	31 Dec 2021
003	\$4,000	Semi-annual	01 Oct 2017	30 Sep 2021
004	\$2,400	Annual	01 Nov 2018	31 Oct 2020

- (c) (2 points) Calculate each type of premium reserve that should be held as of 12/31/2020 for each policy. Show your work.

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

2.

(4 points) You are the reserving actuary for Northern Insurance Company, a small Canadian insurance company offering long-term disability (LTD) group insurance.

- (a) (2 points) Describe challenges you may face in the valuation of Northern Insurance Company's group and health business.

ANSWER:

Employer A has an experience rating refund (ERR) provision in its contract. The future experience of Employer A through the end of its rate guarantee period is projected as follows:

- Premium: \$1,000,000
- Expense Premium: \$300,000
- Profit Charges: \$10,000
- Policyholder Liabilities on New Claims: \$600,000
- Interest Credited: \$10,000
- Interest Required on Existing Policyholder Liabilities: \$15,000
- Policyholder Margin on Existing Claim Liabilities: \$3,000
- Policyholder Margin on New Claim Liabilities: \$6,000
- Policyholder Valuation Expense: \$10,000
- Claims Administration Charges: \$20,000
- Discount Rate: 0%

- (b) (1 point) Calculate the future ERR liability for Employer A. Show your work.

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

2. Continued

Employer B has been a policyholder for several years. You are given the following information on Employer B's claim reserve development during 2020. Amounts are in thousands of dollars.

Claim Duration	Reserve at 1 Jan 2020	Actual Claim Payments	Valuation Interest Amount	Reserve at 31 Dec 2020
5+	300	50	10.0	260
4	140	25	4.6	130
3	180	20	6.4	160
2	230	50	7.2	190
1	300	65	9.4	240

- (c) (1 point) Evaluate the adequacy of the claim reserves:
- (i) For each individual claim duration.
 - (ii) For the lifetime of the policy..

Show your work and justify your answer.

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

3.

(5 points) You are the reserving actuary for a startup insurer.

- (a) (2 points) List and describe key considerations for estimating health and disability claims in accordance with ASOP 5.

ANSWER:

The startup insurer is about to make its first offer of short-term disability insurance to a company with two employees, as follows:

- 50-year-old with an annual salary of \$72,000
- 60-year-old with an annual salary of \$96,000

The benefit terms of this sale are as follows:

- 3-month elimination period
- 3-month benefit period
- Benefits are paid at the beginning of the month to disabled individuals.
- Benefit payments will be a fixed percentage of the disabled employee's monthly salary. The percentage will be the same for both employees.

The assumed annual interest rate is 4%.

Reserves are set using the following continuance table:

Claim Duration (in months)	Number of Disabled Individuals by Claim Duration	
	Age 50 at claim	Age 60 at claim
0	1,000	1,000
1	950	980
2	900	960
3	850	940
4	800	920
5	750	900
6	700	880

Your manager has requested that the maximum possible tabular claim reserve for both employees at any point in time equal \$30,000.

- (b) (3 points) Calculate the fixed percentage of salary that will be offered as a benefit based on your manager's request. Show your work.

<i>The response for this part is to be provided in the Excel spreadsheet.</i>

Question 4 pertains to the Case Study

4.

(5 points) You are a long-term disability (LTD) reserving actuary for Thunderball Corporation.

(a) (2 points)

- (i) List and describe common policy provisions that should be considered in LTD claim reserving.
- (ii) Explain how each of the policy provisions listed in part (i) may impact the reserve calculation for LTD benefits.

ANSWER:

Mary Smith is a female LTD claimant with a monthly benefit of \$3,000. To set the reserve for her policy, Thunderball Corporation uses the factors from Exhibit 4 of the case study.

Mary is age 35 and her claim duration is 48 months. The present value of Mary's next 12 monthly payments, discounted for interest and continuance probability, is \$34,465.

- (b) (3 points) Calculate the probability that Mary will still be an active claimant in one year. Show your work.

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

5.

(5 points) You are an actuarial associate in the Group Life valuation area.

You have been provided the following historical paid claims data. Based on past experience, all claims are paid within 5 months of incurral.

Incurral Year	Months Between Incurral and Payment					Total Paid Claims
	0	1	2	3	4	
	Number of Claims Paid					
2018	792	396	264	132	72	\$175,000,000
2019	912	455	302	154	84	\$210,000,000

You also received the following information splitting recent 2020 claims activity by incurral and paid month.

Incurral Month	Number of Claims by Paid Month			Total Paid Claims Through 12/31/2020
	Oct 2020	Nov 2020	Dec 2020	
Oct 2020	38	23	12	\$8,900,000
Nov 2020		46	23	\$8,400,000
Dec 2020			38	\$4,600,000

Based on recent internal studies, the average annual mortality rate increase is 4% and the average annual wage increase is 3%. Group life benefit amounts are typically in proportion to wages.

- (a) (2 point) Recommend completion factors for use in reserving. Show your work.

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

- (b) (1 point) Calculate the number of incurred but not paid (IBNP) claims and the IBNP dollar amount for incurral months Oct 2020 to Dec 2020 using the completion factor method. Show your work.

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

5. Continued

Your boss mentions that there are some unusual patterns in the claims data.

- (c) (2 points) Propose questions to investigate based on your analysis of the patterns in the claims data. Justify your answer.

ANSWER:

6.

(10 points)

- (a) (2 points) List items you should disclose pursuant to ASOP 19 when preparing a report on an actuarial appraisal.

ANSWER:

You are given the following about a block of group disability insurance; amounts are in \$M:

Component of Value	Discounted Present Value
Adjusted Book Value	100
Present Value of Business In Force at 12/31/2020	220
Cost of Capital Based on 200% of Risk-Based Capital for In Force Business	30
Ten Years of New Business from 12/31/2020	250
Unallocated Expense Related to New Business	10
Cost of Capital Based on 200% of Risk-Based Capital for New Business	35

In addition, you are provided:

- Discount Rate of 10%
- Tax Rate of 30%

- (b) (2 points)

- (i) Calculate the embedded value of the group disability block as of 12/31/2020.
- (ii) Calculate the actuarial appraisal value of the group disability block as of 12/31/2020..

Show your work.

<i>The response for this part is to be provided in the Excel spreadsheet.</i>

6. Continued

Cherry Insurance Company is considering selling their company to Plum Insurance Company. Cherry has retained you as a consulting actuary and asked you to develop an actuarial appraisal.

You will use the following assumptions in your appraisal:

- 2020 premium was \$9,000,000.
- Cherry has 10,000 members in 2021 and enrollment is projected to grow at 20% each year.
- 2021 average premium per member per year (PMPY) is \$1,000. No growth in premium PMPY is expected.
- The target loss ratio is 70%.
- Expenses including commissions are 10% of premiums.
- The claims reserve under Generally Accepted Accounting Practice (GAAP) accounting is 15% of premium.
- The claims reserves under statutory accounting is more conservative at 20% of premium.
- Required capital is 10% of premium.
- Cherry always holds the minimum required capital, and earns no interest on capital. The capital will not be released at the end of the appraisal projection time horizon.
- You will select a discount rate using the Capital Asset Pricing Model and the following information:
 - Risk free rate = 3%
 - Beta = 2
 - Expected market rate of return = 5%
 - Tax rate = 21%
 - Cherry has no debt and no investment income.

- (c) (4 points) Calculate the actuarial appraisal value of Cherry as of 12/31/2020 assuming a 3-year time horizon. Show your work.

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

- (d) (2 points) Describe eight reasons why Plum might ultimately buy Cherry at a different amount than your appraisal value.

ANSWER:

7.

(6 points)

- (a) (2 points) Explain how eight considerations from ASOP 41 apply to an actuary's work signing actuarial opinions for annual statements.

ANSWER:

- (b) (1 point) List six statements that the actuary is asked to make regarding financial items when signing an actuarial opinion for an annual statement.

ANSWER:

7. Continued

You are an actuarial consultant. You will be signing actuarial opinions for the annual statutory statements of two health insurer clients, Company Alpha and Company Bravo. You have been provided with draft annual statements and supporting information including the following.

Company Alpha

- The laws and regulations of the state of domicile regarding health liabilities differ from those of most other states.
- The liabilities were set by one method for group business and by a different method for individual business.
- The total unpaid claim liability is above your range of reasonable estimates, and additionally the company has added a 25% conservative margin.
- The company may have entered a new line of business this year, but you are not certain.

Company Bravo

- The company is a new client. You were not involved with the prior year's calculations, and have no knowledge how they were performed.
- Some actuarial assumptions were set by the company's management.
- The total unpaid claim liability is below your range of reasonable estimates, and no conservative margin is added. By your calculations there is a 20% chance that the liability is too high, and an 80% chance it is too low.
- The company will comment in the annual statement about their reserve for experience-rated refunds. They suggest that you don't need to opine on it.

(c) (3 points) Recommend how to address issues you face as the signing actuary, referring to the scenarios above and relevant items from the list in (b), for:

- (i) Company Alpha
- (ii) Company Bravo

ANSWER:

****END OF EXAMINATION****