

# Exam GHFVA

**Date:** Wednesday, April 29, 2020

**Time:** 1:30 p.m. – 3:45 p.m.

## INSTRUCTIONS TO CANDIDATES

### General Instructions

1. This examination has a total of 40 points.

This exam consists of 6 questions, numbered 1 through 6.

The points for each question are indicated at the beginning of the question. Questions 2 and 3 pertain to the Case Study.

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

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Tournez le cahier d'examen pour la version française.



## **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.**

**\*\*BEGINNING OF EXAMINATION\*\***

**1.** (8 points) You are the valuation actuary at a company offering a variety of group insurance products. Included in the plan offerings are major medical, dental, vision, long-term disability (LTD) and long-term care (LTC).

(a) (1 point) Compare and contrast premium deficiency reserves (PDRs) and contract reserves.

You have been tasked to determine if a PDR is required for your current blocks of business.

(b) (1 point) List the four lines of business that the Health Reserves Guidance Manual (HRGM) uses to categorize health coverage.

The projected underwriting cash-flows for the next five years have been provided by a member of the actuarial team, in millions.

<b>Projected Underwriting Cash Flows</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
Group major medical	-\$20	\$0	\$5	-\$3	\$10
Group Dental	-\$3	-\$2	\$0	\$3	-\$1
Group Vision	\$2	\$3	\$4	\$5	\$6
Group long-term disability	\$12	\$12	\$15	\$17	\$17
Group long-term care	-\$15	-\$8	\$0	\$8	\$15
<b>Total</b>	<b>-\$24</b>	<b>\$5</b>	<b>\$24</b>	<b>\$30</b>	<b>\$47</b>

(c) (2 points) Calculate the following. Show your work.

- (i) The testing PDR for each block of business as of year-end 2019.
- (ii) The total PDR based on the grouping guidelines of the HRGM as of year-end 2019.

## 1. Continued

A new insurance policy is being issued to a group with 1,000 lives for the upcoming year. Assume the following:

- Persistency is assumed to be 85% for years two through five and 0% thereafter;
- The policy charges a net level premium;
- Claims are \$1 million in year one and will increase 5% annually thereafter;
- Non-claims expenses are \$0;
- Interest is 3% annually;
- Premiums occur at the beginning of each year, lapses at the midpoint of each year and claims at the end of each year

(d) (4 points) Calculate the following. Show your work.

- (i) (2 points) The net level premium
- (ii) (1 point) The contract reserve at the end of year 2 per original policy, using the prospective method
- (iii) (1 point) The contract reserve at the end of year 2 per original policy, using the retrospective method

**Questions 2 and 3 pertain to the Case Study**

**2.** (6 points) You are setting reserves for the Quantum Health Insurance Company (Quantum).

(a) (1 point) Define the following types of claim liabilities and reserves.

- (i) Due and unpaid (D&U) liabilities
- (ii) In course of settlement (ICOS) claims
- (iii) Incurred but not reported (IBNR)
- (iv) Loss adjustment expenses (LAE)

You are provided with Quantum's case study Exhibit 1.

(b) (1 point) Calculate age-to-ultimate development factors for lag months 1 to 3 using claims incurred in December 2018. Show your work.

You are provided with Quantum's case study Exhibit 5. Claims are fully complete after 12 months.

(c) (2 points) Calculate weighted average age-to-age development factors for lag months 7 to 12, averaging the factors for the 3 most recent paid months using a percentage weight declining by 10% per month. Show your work.

## 2. Continued

You are given the following:

Lag Month	Age-to-age development factor
1	13.073
2	1.902
3	1.197
4	1.134
5	1.046
6	1.018

Incurred Month	Cumulative Paid Claims as of 12/31/2019
Oct 2019	\$1,200,000
Nov 2019	\$600,000
Dec 2019	\$50,000

- (d) (2 points) Calculate the total incurred but not paid (IBNP) claim reserve as of 12/31/2019 for incurred months October 2019 to December 2019, using the above data and the weighted average age-to-age development factors you calculated in part (c). Show your work.

**Questions 2 and 3 pertain to the Case Study**

- 3.** (8 points) You are calculating reserves for open and IBNR (incurred but not reported) claims on the long term disability (LTD) block of The Thunderball Corporation.

The following open claimants are a sample of Thunderball's block.

Age	Duration (Months)	Gender	Elimination Period	Own Occupation Period	Benefit Amount
29	48	M	3 Months	24 Months	\$6,000
34	18	F	3 Months	24 Months	\$9,000
41	9	M	6 Months	24 Months	\$6,000
48	60	F	6 Months	24 Months	\$9,000

- (a) (1 point) Calculate the change in the total reserve for these open claimants due to the use of the new reserve factors. Show your work.

An actuarial student observed in Thunderball's Exhibit 1 that the factors for age 27, duration 4 are lower than the factors for age 50, duration 4, but the factors for age 27, duration 60 are higher than the factors for age 50, duration 60. The student questions whether these relationships are reasonable.

- (b) (3 points)
- (i) (0.5 points) State the general formula for a tabular claim reserve for an open claim at duration  $n$ .
- (ii) (2.5 points) Explain why the Thunderball factors are reasonable, considering the components of the formula in (i).



### 3. Continued

You are provided with the following:

Incurred Month	Earned Premium	Reported Claims as of 12/31/2019	Incurred Claims as of 12/31/2020	Retrospective Tabular Reserve as of 12/31/2019 for Claims Reported After 12/31/2019
Jul 19	\$10,000,000	\$6,900,000	\$6,900,000	\$0
Aug 19	\$10,000,000	\$7,300,000	\$8,100,000	\$600,000
Sep 19	\$10,000,000	\$5,200,000	\$7,400,000	\$2,300,000
Oct 19	\$10,000,000	\$3,500,000	\$7,800,000	\$4,000,000
Nov 19	\$10,000,000	\$1,300,000	\$6,600,000	\$4,500,000
Dec 19	\$10,000,000	\$400,000	\$8,200,000	\$7,500,000
<b>Total</b>	<b>\$60,000,000</b>	<b>\$24,600,000</b>	<b>\$45,000,000</b>	<b>\$18,900,000</b>

Incurred Month	Earned Premium	Reported Claims as of 12/31/2020
Jul 20	\$11,000,000	\$7,900,000
Aug 20	\$11,000,000	\$7,800,000
Sep 20	\$11,000,000	\$6,700,000
Oct 20	\$11,000,000	\$4,100,000
Nov 20	\$11,000,000	\$2,400,000
Dec 20	\$11,000,000	\$300,000
<b>Total</b>	<b>\$66,000,000</b>	<b>\$29,200,000</b>

The pricing loss ratio is 75%.

(c) (4 points)

- (i) (2 points) Calculate the December 31, 2020 IBNR reserve using each of these methods:
- Percentage of premium
  - Lag
  - Loss ratio

Show your work.

- (ii) (2 points) Recommend an IBNR reserve as of December 31, 2020. Justify your answer.

**4.** (4 points) You are a valuation actuary for long-term care insurance. Your benefit administrator sent you the following information about their claim practices. You plan to review the information and then summarize your findings.

- Claim and member information files are sent on Friday of each week.
- For individuals who die or recover, the claim status is immediately updated and the claim is closed. For surviving individuals, the claims data is not sent to you until the data is verified, which may take several weeks.
- When a claim is closed that has terminated due to death or recovery, the claimant is removed from the open claims file before the last set of claims is submitted.
- Some claimant characteristics are recorded in the claim file as of the initial date of the claim, and subsequently updated only on January 1st of each year. This information includes date of birth, gender, region, type of care provider, and health status of the claimant's spouse.
- The benefit administrator's office closes each August, and no claims are processed during that month.
- Next month the claims system will be upgraded.

(a) (2 points) Explain the problems these practices can cause in setting your claim reserves.

(b) (2 points) Explain possible solutions to address the problems identified in part (a).

**5.** (8 points) Your insurance company is looking to sell a subsidiary.

(a) (2 points) Describe each of the components of an actuarial appraisal:

- Adjusted book value
- Value of in force business, and
- Value of future business capacity.

(b) (1 point) Describe how an embedded value analysis can be used to support an actuarial appraisal.

You are given the following information:

- The embedded value of the subsidiary is \$315 million.
- The projected actuarial value of new business for the subsidiary next year is \$15 million.
- The number of years for new business assumed for the actuarial appraisal analysis is five years.
- The projected growth rate of new business is 8%.
- The risk discount rate being used for the appraisal is 12%.

(c) (2 points) Calculate the actuarial appraisal of the subsidiary. Show your work.

Your company is considering using a reinsurance mechanism to sell the subsidiary.

(d) (3 points)

- (i) (1 point) List the primary reinsurance mechanisms available.
- (ii) (2 points) Describe advantages and disadvantages of the reinsurance mechanisms listed in part (i).

- 6.** (6 points) You are provided with the following for which you will be recommending a claims reserve method:
- (i) A small group medical block with 5 years of consistent experience on 100,000 members
  - (ii) A new short-term major medical block with no prior experience
  - (iii) A medical reinsurance coverage for which claims are infrequent, but very large when they occur
  - (iv) Statutory reserves on reported claims for a long-term disability (LTD) block
  - (v) Pending claims for an LTD block
  - (vi) Incurred but not reported (IBNR) claims for an LTD block
  - (vii) Liabilities associated with specific litigated claims, which are potentially very large
  - (viii) IBNR claims in the most recent incurred month, for medical coverage of a very large employer group
- (a) (3 points) Recommend a claim reserve method for each of the above. Justify your answers.
- (b) (3 points) Describe a different consideration for each of the above in estimating incurred claims as described in ASOP 5.

**\*\*END OF EXAMINATION\*\***

**USE THIS PAGE FOR YOUR SCRATCH WORK**

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