

# Exam GHVRC

**Date:** Wednesday, May 3, 2023

## INSTRUCTIONS TO CANDIDATES

### General Instructions

1. This examination has 7 questions numbered 1 through 7 with a total of 70 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.

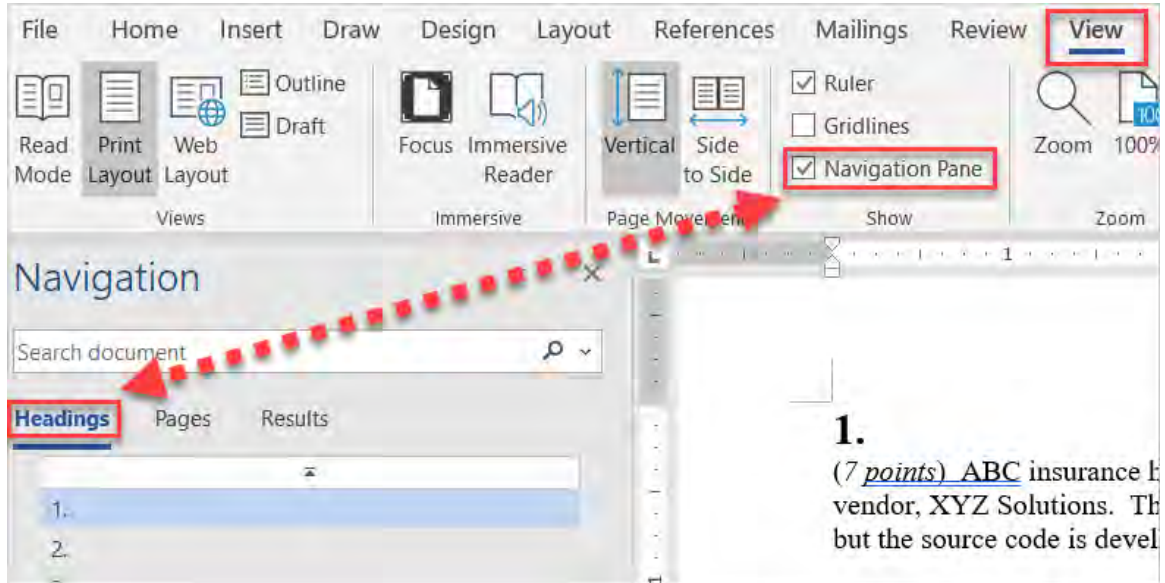
### Written-Answer Instructions

1. Each question 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,  $\beta_1$  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.

## Navigation Instructions

Open the Navigation Pane to jump to questions.

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



*The Excel spreadsheet has  
additional data and information applicable to this question.*

**1.**

(12 points) Canadian insurance company XYZ has offered group life and long-term disability (LTD) coverages for decades. In January 20X1, the company started to offer accidental death and dismemberment (AD&D), short term disability (STD), and supplemental health coverage to their existing clients.

As an actuarial analyst, you are asked to prepare reserve calculations for all lines of business.

- (a) (2 points) List and describe the types of claim reserves and claim liabilities required in regulatory statements.

ANSWER:

- (b) (3 points)

- (i) List and describe basic techniques to estimate claim reserves.

ANSWER:

- (ii) Recommend reserve methods for each of XYZ's products. Justify your answer.

ANSWER:

In the Excel spreadsheet, you are provided with the historical supplemental health paid claims since the coverage became effective in January 20X1.

- (c) (4 points) Calculate the total incurred health claims from January 20X2 to June 20X2 using an average of the most recent six months' age-to-age factors. Show your work.

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

- (d) (1 point) Critique the use of the development method in part (c).

ANSWER:

## 1. Continued

- (e) (2 points) Calculate the Incurred But Not Paid (IBNP) reserve as of June 30, 20X2 by applying both credibility weights and an alternative method. State your assumptions and show your work.

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

*The Excel spreadsheet has  
additional data and information applicable to this question.*

**2.**

(11 points) You are a benefit consultant at Gas Plus. Gas Plus is a natural gas trading company headquartered in Toronto with employees and locations across Canada. Gas Plus offers extended health and long-term disability plans to all its employees. Gas Plus pays 100% of the premium and its benefits plans are fully insured by ABC Insurance.

- (a) (1 point) Compare and contrast how the provincial health insurance plans are financed in Ontario and in British Columbia (BC).

ANSWER:

- (b) (1 point) List and describe the main updates contained in the 2018 Joint Statement of the pan-Canadian Pharmaceutical Alliance (pCPA) and the Canadian Generic Pharmaceutical Association (CGPA).

ANSWER:

One of ABC's cost control methods is to make sure plan members apply for government assistance where possible. You have been provided with three different cases related to specific employees.

## 2. Continued

**Case #1** – The Excel spreadsheet provides information on Nancy, an employee of the Toronto office:

(c) (3 points)

- (i) Assess if Nancy’s family is eligible for reimbursement under any of the public plans in Ontario. Justify your answer.

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

- (ii) Calculate the claim amounts paid by ABC, the Ontario public plans and Nancy’s family from August 2022 to July 2023. State any assumptions and show your work.

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

**Case #2** – The Excel spreadsheet provides information on John, a single employee of the Vancouver office:

- (d) (3 points) Calculate the difference in paid amount in 2023 by BC Pharmacare, ABC and John if John uses Remicade or Inflectra for all of 2023. State any assumptions and show your work.

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

**Case #3** – The Excel spreadsheet provides information on Kevin, a disabled employee of the Calgary office:

(e) (3 points)

- (i) Describe the qualifying conditions for CPP disability benefits.

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

- (ii) Calculate the net monthly disability benefit that Kevin will receive from ABC if he is approved for CPP. State any assumptions and show your work.

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

*The Excel spreadsheet has additional data and information applicable to this question.*

**3.**

(9 points) You are a consulting actuary for Company XYZ that completes an annual actuarial valuation for the following post-retirement and post-employment benefits.

<b>Benefit</b>		<b>Provisions</b>	<b>Eligibility</b>
Health Spending Account (H.S.A.)	Post-retirement benefit	Maximum \$5,000 annual benefit. Resets every year on January 1st	At least 10 years of service and age 55 at retirement
Long Service Gratuity	Post-employment benefit	One week pay for each year of service, up to 10 years of service	Paid out at death, termination, or retirement for those with at least 5 years of service

XYZ reports under International Accounting Standards (IAS) 19 and the benefits described above are unfunded.

Recently, XYZ promoted an employee internally, Sabrina, from Senior Financial Analyst to Director of Finance. Sabrina has little experience with post-retirement and post-employment benefits and has reached out to you to learn more about the actuarial valuation and accounting process.

(a) (3 points) Describe the steps under IAS 19 for each benefit offered for:

(i) Determining the deficit or surplus at year end

ANSWER:

(ii) Determining the amounts to be recognized in profit or loss

ANSWER:

(iii) Determining the remeasurements of the defined benefit liability to be recognized in Other Comprehensive Income

ANSWER:

### 3. Continued

To get a better understanding of the valuation calculations, Sabrina has provided you the following information about herself as of the December 31, 2022 valuation date:

Gender:	Female
Year of hire:	2019
Year of birth:	1966
Annual salary:	\$125,000

The Excel spreadsheet provides valuation assumptions as of December 31, 2022.

(b) (4 points) Calculate the following metrics for Sabrina for each benefit being offered:

(i) the present value of future benefits as of the valuation date

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

(ii) the benefit obligation as of the valuation date

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

(iii) the service cost for 2023

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

State any assumptions and show your work.



### 3. Continued

With rising interest rates, Sabrina is interested in the impact to the valuation results. Using her own demographic, she estimates that a 1% increase in the discount rate assumption would result in approximately a 15% decrease in XYZ's overall benefit obligation and a 15% decrease in the amounts to be recognized in profit or loss.

(c) (2 points) Critique Sabrina's statement on:

(i) The impact of the interest rate change to XYZ's overall benefit obligation

ANSWER:

(ii) The impact of the interest rate change to the amounts to be recognized in profit or loss

ANSWER:

#### 4.

(11 points) You are the appointed actuary at XYZ insurance company. Recently, XYZ acquired a closed block of individual long-term disability (LTD) business from ABC insurance company (ABC). The closed block is composed entirely of disabled individuals.

- (a) (1 point) Identify the types of liabilities that XYZ would need to hold for the acquired block from ABC. Justify your response.

ANSWER:
---------

You are provided with the following sample policyholder data as a model representative point for the acquired block of ABC:

	<b>Sample Policyholder A</b>
Status	Disabled
Valuation date	December 31, 2022
Date of birth	December 31, 1967
Date of disability	June 30, 2016
Elimination Period	6 months
Benefit termination age	65
Annual benefit payment after Elimination Period	\$30,000, paid annually on December 31
Cost of Living Adjustment (COLA)	2%, applied annually at the beginning of each calendar year
Contractual Service Margin (CSM) balance as at the valuation date	\$25,000

	<b>Valuation assumptions</b>
Locked-in discount rate	4.0% per annum
Asset earned rate	4.5% per annum
CSM accretion rate	3.0% per annum

#### 2022 Claims Termination Rate Study

Claims Duration	Year 1	Year 2	Year 3	Year 4+
Expected Termination (per 1,000 lives)	500	150	75	200
Actual Terminations (per 1,000 lives)	350	200	100	150

#### 4. Continued

- (b) (1 point) Calculate a best estimate tabular claim reserve for Policyholder A as of the valuation date. State any assumptions and show your work.

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

As IFRS 17 became effective for the period beginning on January 1<sup>st</sup>, 2023, XYZ is exploring the different IFRS 17 approaches for the recognition of future revenues on the acquired block of business.

- (c) (2 points) Compare and contrast the following approaches for revenue recognition under IFRS 17:

- (i) Liability for Incurred Claims (LIC) approach

ANSWER:

- (ii) Liability for Remaining Coverage (LRC) approach

ANSWER:

- (d) (4 points) Construct the CSM amortization schedule as of the valuation date under the following approaches, using Policyholder A as a representative point for the acquired block of business:

- (i) LIC approach

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

- (ii) LRC approach

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

State any assumptions and show your work.

- (e) (1 point) Recommend an approach for XYZ for revenue recognition of the acquired block of business. Justify your answer.

ANSWER:

#### 4. Continued

You have concerns over the recent claims termination experience at ABC insurance company.

- (f) (1 point) Critique the 2022 claims termination rate study based on actual-to-expected (A/E) ratios. State any assumptions and show your work.

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

- (g) (1 point) Propose questions that XYZ should ask to ABC in order to get a deeper understanding of their 2022 experience study results.

ANSWER:

*The Excel spreadsheet has additional data and information applicable to this question.*

**5.**

(7 points) You are a benefit consulting actuary at ABC. ABC is a company operating in both Ontario and Quebec. ABC has 125 employees in Ontario and 45 employees in Quebec. ABC started to offer a health benefit plan to all its employees beginning January 1, 2018. Its health plan has been fully insured by HealthierPlus Insurance Company since the beginning and the plan covers 100% of eligible drug costs with no deductions. As the current plan carries an EP3 certificate, the claims over the EP3 threshold are pooled.

In order to get the most competitive health plan rates, you recommended that ABC should go to market and request quotes from other insurers every five years. However, the CEO of ABC suspects ABC has some recurring high cost drug claims.

The CEO worries that other carriers will consider the full cost of claims and therefore, the price quoted will be much higher than the existing pricing, which limits his ability to shop the business.

- (a) (1 point) Critique the CEO's statements. Justify your answer.

ANSWER:

After having explained the Canadian life and health insurance industry pooling agreement to the CEO, he is interested to know how the agreement protects the EP3 and Industry Pool from anti-selection.

- (b) (1 point) Explain how the Canadian life and health insurance industry pooling agreement protects the EP3 and Industry Pool from anti-selection under the following two scenarios:

- (i) An Administrative Services Only (ASO) group with claims greater than the ongoing threshold in prior years wants to become fully-insured.

ANSWER:

- (ii) A plan sponsor wants to introduce drug coverage for its employees.

ANSWER:

## 5. Continued

(c) (1 point) Describe how the pooled drug claims cost is shared among participating insurers in the following pools:

(i) Canada Drug Insurance Pooling Corporation (CDIPC)

ANSWER:

(ii) Quebec Drug Insurance Pooling Corporation (QDIPC)

ANSWER:

The Excel spreadsheet provides the following information:

- EP3 pooling thresholds (per certificate) from 2018 to 2022
- CDIPC pooling thresholds and maximum pooling level (per certificate) from 2018 to 2022
- QDIPC pooling thresholds and annual factors for 2022
- Historical drug claims for certificates that had at least one annual drug claim above the EP3 threshold

For all other certificates that did not have any claims above the EP3 threshold in the past, assume that the average annual claims cost is \$960 for 2022

(d) (4 points) Calculate the 2022 claims paid by the following:

(i) HealthierPlus Insurance Company

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

(ii) QDIPC

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

(iii) CDIPC

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

State any assumptions and show your work.

## 6.

(8 points) You are a consulting actuary supporting your client Company XYZ, an accounting firm that has offices in Ontario.

XYZ offers the following group benefits to its employees and retirees:

- Life
- Accidental Death & Dismemberment (AD&D)
- Extended Health
- Dental
- Short-term and long-term disability (provided to employees only)

As a result of the COVID-19 pandemic, all employees at Company XYZ now have an option of working remotely or in the office.

- (a) (2 points) Describe XYZ benefit plan considerations for employees working remotely outside of Ontario.

ANSWER:

Recently, one of Company XYZ's employees at its Toronto office contracted COVID-19. Despite the employee following the office's strict COVID-19 prevention protocols, it was identified through the provincial contact tracing program that the employee contracted the virus by sharing the elevator with a "superspreader". Unfortunately, the employee had pre-existing respiratory issues and passed away.

- (b) (2 points) Justify whether the situation described above would be considered an eligible AD&D claim by referencing any applicable court rulings.

ANSWER:

## 6. Continued

With travel restrictions lifted and COVID-19 testing no longer required for travel, more employees and retirees are taking vacation out-of-country. One of Company XYZ's retirees, John, recently went to Mexico and incurred a \$30,000 claim for a semi-private hospital stay.

John had the following out-of-country health coverage:

Policy type	Coverage level
Retiree group plan	Lifetime maximum: \$75,000 Claims to date: \$15,000
Spouse retiree group plan	Lifetime maximum: \$50,000 Claims to date: \$0
Individual plan	Per trip limit of \$1,000,000 Claims to date: \$0

- All plans have 100% coinsurance for a semi-private hospital room
- Assume that there is no reimbursement under the Government Health Insurance Plan
- The individual plan has a provision that stipulates that the plan will pay in excess of all other plans

When the claim occurred, John contacted his retiree group plan and provided the information of the retiree group plan to the hospital.

(c) (4 points) Pertaining to this specific situation:

(i) Explain how to determine the first carrier.

ANSWER:

(ii) Describe the responsibilities of the first carrier.

ANSWER:

(iii) Calculate the amount reimbursed by each plan. State any assumptions and show your work.

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



*The Excel spreadsheet has  
additional data and information applicable to this question.*

**7.**

(12 points) You are the appointed actuary of XYZ Life Insurance company overseeing the annual filing process of Financial Condition Testing (FCT) and Life Insurance Capital Adequacy Test (LICAT). XYZ offers individual and group life products to Canadians.

When FCT replaced Dynamic Capital Adequacy Testing (DCAT) in 2019, some revisions were made to the Standard of Practice (SOP) to reflect the change.

- (a) (2 points) List the changes to the SOP related to the introduction of FCT.

ANSWER:

- (b) (2 points) List and describe key elements of:

- (i) FCT

ANSWER:

- (ii) LICAT ratios

ANSWER:

## 7. Continued

- (c) (2 points) Describe how the Base Solvency Buffer is determined in LICAT.

ANSWER:

You have been asked to calculate the required capital for the mortality risk component on a block of individual death supported policies.

You are given the following information as of December 31, 2022:

Best estimate mortality improvement assumption	None
Total net amount at risk for all policies	\$285,526
Total net face amount for all policies	\$390,363
Projected value of the upcoming year's total net death claims for all policies:	\$8,075
$\sum b^2$ where b is the net death benefit amount for a given policy	\$6,549,886
Spot discount rate	5.3%

The Excel spreadsheet provides the liability cash flows under various mortality shock scenarios.

- (d) (4 points) Calculate the required capital for the mortality risk component as of December 31, 2022. State any assumptions and show your work.

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

Before publicly disclosing the annual results for 2022, the external auditor has peer reviewed your LICAT calculation and indicates to you that the block of individual policies should had been classified as "life supported" instead of "death supported".

- (e) (2 points)
- (i) Justify why the auditor statement is incorrect. State any assumptions and show your work.

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

- (ii) Explain how the required calculation for the mortality risk component would have been different if the auditor statement was true.

ANSWER:

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