SOCIETY OF ACTUARIES®

Exam ILALFMC

Life Financial Management - Canada

Date: Tuesday, May 6, 2025

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 9 questions numbered 1 through 9 with a total of 80 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 document as directed within each question. Graders will only look at work in the indicated file.

   a) In the Word document, answers should be entered in the box marked ANSWER within each question. 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 x^2 can be typed as x^2.

   b) In the Excel document formulas should be entered. For example, X = component1 + component2. 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 unique candidate number in the filename. To maintain anonymity, please refrain from using your name and instead use your candidate number.

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

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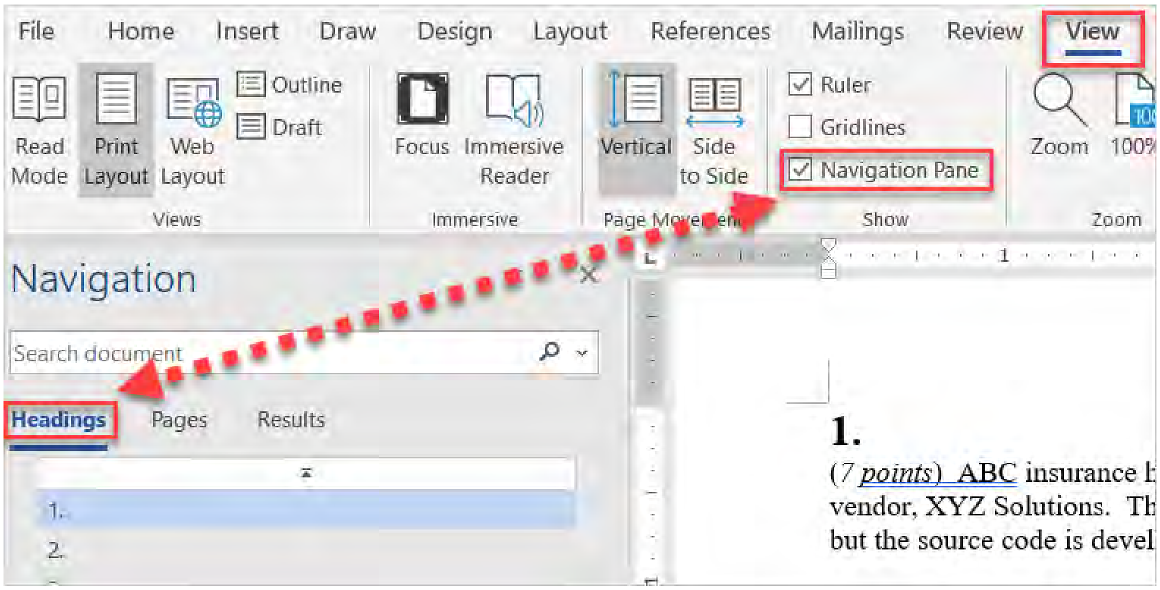
Navigation Instructions

Open the Navigation Pane to jump to questions.

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



1.

(*8 points*) ABC is a life insurance company.

(a) (*2 points*) ABC is developing a non-participating whole life product that will be valued using the General Measurement Model (GMM).

Explain how electing the OCI option will affect income volatility.

ANSWER:

(b) (*2 points*) ABC is developing a new participating whole life insurance product with following characteristics:

- Policyholder dividends are based on interest, mortality and expense experience of the participating fund.
- Gains in the par fund are to be split evenly between the shareholders and policyholders.

Assess the eligibility of the proposed participating product to be valued under the Variable Fee Approach (VFA). Justify your response.

ANSWER:

(c) (*4 points*) Critique the following statements:

A. *Interest accretion on the CSM will be the same under VFA and GMM because the determination of current discount rates and locked-in rates is not affected.*

ANSWER:

B. *The use of YRT reinsurance for mortality risk will not affect income volatility under VFA if the reinsurance costs are passed through to policyholder dividends.*

ANSWER:

1. **Continued**

C. *The risk adjustment for mortality and expenses will be part of the policyholders' share of the underlying under VFA because these amounts are passed through to the policyholders.*

ANSWER:

D. *Adding a minimum interest rate guarantee to a participating product will not affect eligibility for VFA.*

ANSWER:

2.
(*7 points*)

(a) (*2 points*) Critique the following statements with respect to IFRS17 discount rates and fair value:

A. *Any impacts affecting the Contractual Service Margin (CSM) should be quantified using the discount rate at the time of issue regardless of the prevailing discount rate at any future valuation date.*

ANSWER:

B. *Under IFRS 17, non-performance risk should be included in the fulfilment cash flows.*

ANSWER:

C. *The same illiquidity premium for both reinsurance contracts and underlying direct contracts should be used to develop the IFRS 17 discount curve.*

ANSWER:

D. *Non-attributable expenses are included in neither the IFRS 17 fulfilment cash flows nor the fair value of an insurance contract.*

ANSWER:

2. **Continued**

(b) (*5 points*) Using the information provided in Excel for a newly acquired block of business:

(i) Calculate the CSM using the Adjusted FCF approach.

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

(ii) Calculate the CSM using the Actuarial Appraisal Value approach.

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

3.

(*8 points*) A small Canadian insurance company sells term and accidental death life insurance. The liabilities are backed by Canadian government bonds and bonds issued by agricultural farming companies.

(a) (*4 points*) Critique the following statements with respect to the company's climate risk management practices and policies.

A. *The company has identified that agricultural farming companies are greenhouse gas intensive, but it has no climate related financial risks in these investments.*

ANSWER:

B. *The company's climate scenarios will be those promulgated by OSFI and publicly disclosed to allow comparison among peers.*

ANSWER:

C. *The company began its disclosures in 2023. Disclosures will be made every two years and will change to keep up with how its competitors quantify their climate-related risks.*

ANSWER:

D. *The company does not include its climate risk disclosures in its report to shareholders, but instead includes it in its ORSA.*

ANSWER:

E. *The company's level of detail in its disclosure is significantly less than the average Canadian company and follows OSFI's recommended format.*

ANSWER:

3. **Continued**

F. *The company uses tools developed by the Canadian Farmer's Association to identify and quantify the company's physical risk of flooding occurring on farms and resulting impact on insurance claims.*

ANSWER:

(b) (*4 points*) Critique the following practices with respect to the company's Own Risk and Solvency Assessment (ORSA):

A. *The company follows OSFI's Guideline on ORSA (E-19) on prescribed methodology, assumptions and data. However, the confidence level is lower than prescribed and requires approval by OSFI.*

ANSWER:

B. *Material risks are quantified by applying stochastic approaches to its valuation models. Less material risks are quantified by using sensitivity testing.*

ANSWER:

C. *The company identifies, defines and assesses the materiality of all known and reasonably foreseeable risks captured by LICAT.*

ANSWER:

D. *ORSA is a point in time quantification to potential adverse capital impacts. The company's Financial Condition Testing contemplates the potential adverse capital impacts over a five-year planning horizon.*

ANSWER:

E. *The company's ORSA is independently reviewed by their internal auditor every three years as part of its internal audit cycle.*

ANSWER:

3. Continued

F. The company sets their internal LICAT target ratio by adding 20% to the Supervisory Target Total Ratio and adding 15% to the Supervisory Target Core Ratio. This approach is validated by their ORSA.

ANSWER:

4.

(*11 points)* XYZ is a Canadian Life Insurer.

(a) (*2 points*) Explain how XYZ can ensure there are no adverse impacts to their LICAT ratio when switching from a registered to an unregistered reinsurer.

ANSWER:

(b) (*2 points*) XYZ's Total Ratio is 120%. Explain possible reasons why the Appointed Actuary may want to improve the ratio.

ANSWER:

(c) (*2 points*) List the conditions a product must meet to receive adjustable credit under LICAT.

ANSWER:

(d) (*3 points*) You are given the following:

	Gross Cashflows	
Year	Best-Estimate	Mortality Level Shock
1	100	120
2	200	240
3	250	300
4	300	360
5	400	480

RC_{vol} =	150
RC_{cat}=	60
RC_{trend}=	0

Calculate required capital for mortality risk ($RC_{mortality}$).

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

4. **Continued**

(e) (*2 points*) State the direction the Total LICAT ratio would move for each of the following. Justify your answer.

(i) An insurer issues additional common shares.

ANSWER:

(ii) An insurer experiences rapid growth resulting in direct written premiums increasing by 50%.

ANSWER:

(iii) An insurer selling only life-supported products acquires a block of annuities.

ANSWER:

(iv) An insurer enters an Administrative Services Only (ASO) contract.

ANSWER:

5.

(*10 points*)

(a) (*3 points*) Propose coverage units for the following insurance products:

(i) Disability insurance under Liability for Incurred Claims (LIC) approach

ANSWER:

(ii) Permanent life insurance with cash surrender values

ANSWER:

(iii) Universal life insurance where death benefit is face amount plus account value

ANSWER:

(iv) Immediate annuities

ANSWER:

5. **Continued**

(b) (*4 points*) You are provided with the following data:

- Portfolio of 10-year term insurance policies with face amount of 10,000
- Opening CSM = 500
- Decrement rate = 4% per year
- Initial insurance finance expense of 3, decreasing by 0.3 per period.
- Assume no discounting of coverage units.
- Locked-In Rate = 3%.

(i) (*3 points*) Calculate the profit realized in each year. Show all your work in Excel.

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

(ii) (*1 point*) Explain how using discounting in the calculation of coverage units would affect profit emergence. Justify your answer. Numerical answer is not required.

ANSWER:

(c) (*3 points*) Compare and contrast the margin and cost-of-capital approaches to setting the Risk Adjustment under IFRS17.

ANSWER:

6.

(*8 points*)

(a) (*2.5 points*) Critique the following statements with respect to Solvency II:

A. *The Solvency Capital Requirement (SCR) is the level of capital at which a company would be expected to remain solvent over the next year with 85% probability. A company with a SCR ratio of 76% would require an early intervention by the regulator.*

ANSWER:

B. *The spread adjustment applied to the discount rate used in determining best estimate liabilities is meant to apply a level of conservatism to the technical provisions.*

ANSWER:

C. *Asset and liability market values are determined using a model calibrated to market data. The model would include a risk premium.*

ANSWER:

(b) (*3 points*) Critique the following statements with respect to the U.S. regulatory environment:

A. *For a principle-based valuation, the benefits and guarantees must be quantified at a level of conservatism for which conditions are reasonably probable of occurring at the tail end of the risk.*

ANSWER:

B. *Under VM-20, a company may use its own mortality experience if relevant and credible for the deterministic reserve. If experience is not relevant and credible, VM-20 prescribes the most recent Commissioner's Standard Ordinary mortality table.*

ANSWER:

6. **Continued**

C. *If a company's Risk Based Capital (RBC) ratio is 190% it must prepare a plan outlining its actions to bring its ratio above 200%. The plan must be filed with and approved by its regulator.*

ANSWER:

D. *The RBC calculation is generally formulaic, with prescribed factors applied to its U.S. GAAP balance sheet. Other regulatory jurisdictions such as Europe and Bermuda use more model-based approaches. RBC correlation factors are consistent with other regulatory jurisdictions.*

ANSWER:

(c) (*2.5 points*) Critique the following statements with respect to the Bermuda regulatory environment:

A. *For interest rate risk, a company may use a duration-based approach or a shock-based approach. The duration-based approach is a function of the company's asset and liability mismatch. The shock-based approach applies interest rate shocks to the asset and liabilities. The shocks are determined by the company based on the nature of the assets and liabilities and must be approved by the regulator.*

ANSWER:

B. *Mortality, morbidity and longevity risks are calculated using a factor-based approach. Fixed income and equity risks are calculated using a model-based approach.*

ANSWER:

C. *Companies are expected to hold 120% of the Bermuda Solvency and Capital Requirement (BSCR). Available capital for the BSCR ratio is based on any widely accepted accounting measure such as IFRS or U.S. GAAP.*

ANSWER:

7.

(*8 points*)

(a) (*4 points*) Critique the following statements with respect to Canadian life insurance taxation:

A. Canadian companies are taxed on their worldwide income including foreign life insurance.

ANSWER:

B. Policy loans do not affect company taxation.

ANSWER:

C. A face amount increase of 50% over 5 years will not impact the exempt status of a life insurance policy.

ANSWER:

D. The interest rate used in the calculation of the accumulating fund of an exempt-test policy is a function of prevailing government of Canada bond yields.

ANSWER:

(b) (*1 point*) Explain the rationale for introducing the Investment Income Tax (IIT).

ANSWER:

7. Continued

(c) (*3 points*) You are given the following for a Canadian life insurer:

	Dec. 31 2023	Dec. 31 2024
Life Insurance Policies (issued to residents in last 30 years)-Direct Maximum Tax Reserves	400	500
Ceded life insurance policy reserves	90	100
Annuity reserves	200	250
60 month moving average Government of Canada bonds with remaining term to maturity greater than 10 years	3.5%	3.25%

Calculate the 2024 IIT based on the above information. Show all work.

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

8.
(*8 points*)

(a) (*2 points*) Explain the CIA's recommended approach for developing discount rate curves for contracts with each of the following liquidity characteristics using a bottom-up methodology:

- Liquid
- Medium liquid
- Illiquid

ANSWER:

(b) (*1 point*) Explain the principles for determining long-term unobservable rates

ANSWER:

(c) (*5 points*) Critique the following statements with respect to the valuation of financial guarantees under IFRS17. Justify your response:

A. *Financial guarantees within insurance contracts (e.g minimum interest guarantees) are typically valued using replicating assets which closely match the insurance contract cash flows.*

ANSWER:

B. *In a risk-neutral economic scenario generator, the expected return on assets would be equal to its long-term historical rate. Liability cash flows generated using this model would be equal to that rate less a spread.*

ANSWER:

C. *IFRS 17 requires that a market consistent valuation of financial guarantees maximize the use of observable market inputs.*

ANSWER:

8. **Continue**

D. *Market consistent rates beyond the observable period should be held constant at the last observable rate.*

ANSWER:

E. *Consumer price index data should be used to set market-consistent inflation rate assumptions.*

ANSWER:

9.

(*12 points*)

(a) (*8 points*) Given the following for a group of insurance contracts issued with a coverage period of three years:

	Scenario A = Expected				**Scenario B**			
Time	**0**	**1**	**2**	**3**	**0**	**1**	**2**	**3**
Premiums	1,050				1,050			
Claims		175	175	175		175	175	175
Directly attributable acquisition expenses	90				90			
Directly attributable maintenance expenses		45	45	45		90	45	45
Non-directly attributable acquisition expenses	20				20			
Non-directly attributable maintenance expenses		30	30	30		30	30	30

	Scenario C				**Scenario D**			
Time	**0**	**1**	**2**	**3**	**0**	**1**	**2**	**3**
Premiums	700				1,050			
Claims		175	175	175		175	175	175
Directly attributable acquisition expenses	180				90			
Directly attributable maintenance expenses		45	45	45		45	45	45
Non-directly attributable acquisition expenses	20				35			
Non-directly attributable maintenance expenses		30	30	30		30	30	30

9. Continued

Assume the following:

- No risk adjustment or discounting.
- CSM is run off on a straight-line basis
- Insurance acquisition cash flows are amortized evenly over the three years.
- Time 0 cashflows occur at inception; time 1, 2, and 3 cashflows occur during the policy year.

Calculate the profit/loss in year 1 for each of the scenarios. Show all work.

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

(b) (*4 points*) Critique the following statements:

A. *Any expenses that are incurred at a higher level of aggregation than groups of contracts would not qualify as directly attributable.*

ANSWER:

B. *Any abnormal amount of wasted labor or other resources that are used to fulfil the contracts would not be classified as directly attributable expenses and would be excluded from the fulfillment cashflows.*

ANSWER:

C. *Investment expenses related to investment activities that enhance policyholder benefits (e.g., larger amount of coverage offered to the policyholders for the same premium when investments are considered), should be considered directly attributable expenses, even if the assets are not part of the underlying item.*

ANSWER:

D. *Premium taxes are transaction-based taxes collected on behalf of third parties and should be excluded from both insurance service expenses and insurance service revenue.*

ANSWER:

****END OF EXAMINATION****