

Exam ILALFMC

Life Financial Management - Canada

Date: Tuesday, May 9, 2023

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.

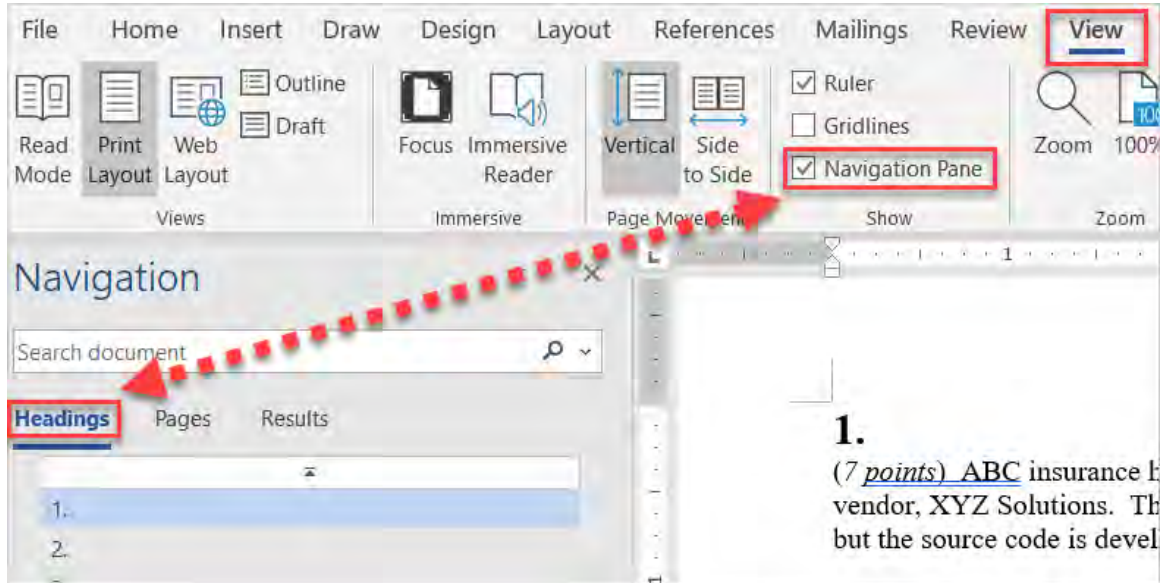
Written-Answer Instructions

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, $X = \text{component1} + \text{component2}$. 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 five-digit candidate number in the filename.
4. The Word and Excel documents that contain your answers must be uploaded before the five-minute upload period expires.

Navigation Instructions

Open the Navigation Pane to jump to questions.

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



1.

(8 points)

- (a) (1 point) List the key elements of Own Risk and Solvency Assessment (ORSA).

ANSWER:

- (b) (5 points) Critique the following statements:

A. *The results of an economic capital model could lead to forced receivership of the company or downgrade of the company.*

ANSWER:

B. *Company ABC determines its interest rate risk as a fixed 10% of reserves factor. The risk assessment is deemed as realistic as the reserves reflect the risk.*

ANSWER:

C. *Both rating agencies and shareholders consider the more capital an insurer has, the better.*

ANSWER:

D. *The “correlation matrix approach” is a common approach used for evaluating the diversification benefit. The correlation assumptions are often set by a combination of historical data or expert forecasts that analyze the relationship between risk scenarios. The correlations are applied to the risk scenarios.*

ANSWER:

1. Continued

- E. *Under the finite risk horizon approach, the Economic Capital represents the current market value of assets required to ensure that the value of liabilities can be covered at a finite point in the future, at the chosen security level, less the current value of liabilities. Under this approach, a run off projection is still required.*

ANSWER:

- (c) (2 points) Describe how Economic Capital can be used as a risk management tool in the following areas below.

- (i) Capital adequacy

ANSWER:

- (ii) Risk appetite

ANSWER:

2.

(13 points) Your company is adopting IFRS 17.

(a) (4 points) Consider each of the following:

- A direct insurance contract which is profitable at issue
- A direct insurance contract which is not profitable at issue

(i) Explain how profit or loss is recognized both at issue and over the duration of the contract under IFRS 17.

ANSWER:

(ii) Explain how the recognition of profit or loss will change if you cede mortality risk through a reinsurance contract held.

ANSWER:

2. Continued

(b) (5 points)

- (i) Describe the necessary steps and requirements in determining the level of aggregation.

ANSWER:

- (ii) You are provided with the following target profit margins for the products sold by your company, expressed as a percentage of the present value of premium:

Issue Age Band	Whole Life	Group Health Insurance	Payout Annuities
<=45	5.00%	50.00%	1.00%
46-65	3.00%	45.00%	1.00%
66+	-5.00%	5.00%	2.00%

Assume actual experience is consistent with the target profit margins.

Recommend how the contracts should be allocated for IFRS 17 measurement purpose. Justify your response.

ANSWER:

2. Continued

(c) (4 points) You are given the following information for a group of insurance contracts:

- Contractual Service Margin (CSM) at issue: 1,000
- The CSM is amortized linearly over a 10-year period
- The locked-in interest rate = 4%
- Current interest rates are the same as the locked-in interest rates
- Basis changes are effective at the end of the year
- For simplicity, the risk adjustment is set to 0

For each of the following outcomes:

- 1) Actual death claims during the year are 300 greater than expected death claims
- 2) A favorable mortality basis change of 400
- 3) An unfavorable mortality basis change of 1,500

- (i) Calculate the impact on profitability at the end of the first year
- (ii) Calculate the impact on insurance contract liabilities at the end of the first year

The response for the entire part (c) is to be provided in the Excel spreadsheet.

3.

(8 points)

- (a) (2 points) Describe four objectives of ASU 2018-12 that improve the accounting for insurance contracts.

ANSWER:

- (b) (2 points) Reserves for a term life insurance product are calculated under ASU 2018-12. Critique the following statements:

A. *The valuation actuary requests an update to the mortality assumption resulting from adverse experience. Due to time constraints, no other assumptions were reviewed.*

ANSWER:

B. *The proposed update to the mortality assumption results in net premiums exceeding gross premiums for some cohorts. In response, the valuation actuary has requested premium deficiency testing.*

ANSWER:

- (c) (4 points) The reserves for a term life insurance product terminating after 10 years are calculated under ASU 2018-12. You are given the following projected cashflows for a cohort of policies:

Year	Benefits	Gross Premiums
1	550.0	1000.0
2	542.1	964.9
3	532.9	929.3
4	527.1	893.2
5	523.5	855.5
6	522.7	812.7
7	515.2	768.0
8	512.4	723.1
9	505.6	675.8
10	496.7	650.4

3. Continued

At the end of year 4, your company updates its mortality assumption to reflect experience. You are given the following updated cashflows:

	Year	Benefits	Gross Premiums
Actual	1	650.0	1000.0
Actual	2	642.1	814.6
Actual	3	632.9	784.6
Actual	4	627.1	754.1
Projected	5	534.2	838.4
Projected	6	544.5	780.2
Projected	7	548.1	721.9
Projected	8	557.0	665.3
Projected	9	561.8	608.2
Projected	10	564.4	572.4

Assume:

- Gross premiums are paid the beginning of the year
- Benefits are paid at the end of the year
- The locked discount rate is 4%
- The current rate at the end of year 4 is 3.5% for all future years

Calculate the following:

- (i) (1 point) Net Premium in year 1

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

- (ii) (3 points) Liability Remeasurement Gain or Loss in year 4.

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

Show all work.

4.

(9 points)

- (a) (1 point) State the criteria for an expense to be classified as directly attributable under IFRS 17.

ANSWER:

- (b) (2 points) Classify each of the following expenses as directly attributable or not directly attributable under IFRS 17. Justify your response.

- (i) Investment expenses for products that relate to the management of assets that are not part of the underlying items

ANSWER:

- (ii) Regulatory and statutory reporting expenses

ANSWER:

- (iii) Generic marketing expenses

ANSWER:

- (iv) Expenses pertaining to a UL sales conference

ANSWER:

4. Continued

(c) (6 points) Your company offers a term life insurance product with the following features:

- Term of the product: 5 years
- Face amount = 10,000
- Single Premium = 200

You are given the following assumptions to be used to value the contract under IFRS 17:

- Maintenance costs / year = 25
- Mortality rate = 1 / 1000 for all ages
- Lapse rate = 10% per year
- Locked-in discount rate = 4%
- Risk adjustment = 10% of the liability for mortality and expenses
- The single premium is paid at inception of the policy
- Expenses are assumed to occur at the beginning of the year
- Death benefits are assumed to be paid at the end of the year

(i) Determine the CSM or loss component at issue. Show all work.

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

(ii) Assume that a basis change increases reserves at the end of the second year by 20 measured at the locked-in discount rate.

Calculate the CSM balance for all years. Show all work.

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

5.

(8 points)

(a) (3 points) For each of OSFI's capital targets specified below:

- Minimum Capital
- Supervisory Target Capital
- Internal Capital targets

(i) Explain the purpose of the target and the minimum thresholds for each.

ANSWER:

(ii) Describe the impact of having capital levels fall below the target.

ANSWER:

5. Continued

- (b) (5 points) You are given the following information for a Canadian stock life insurance company with respect to the LICAT requirements:

Base solvency buffer	8,000
Surplus allowance	1,000
Eligible deposits	1,000
Contributed surplus	3,000
Adjusted retained earnings	3,000
Adjusted other comprehensive income (AOCI)	1,000
Goodwill	2,000
Policy-by-policy negative reserves	2,000
Tier 2 capital instruments	2,500

Assume:

- All business is individually underwritten Canadian life business
- Negative reserves are not recoverable on surrender

- (i) Calculate the Total Ratio.

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

- (ii) Calculate the Core Ratio.

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

- (iii) Outline the implications of the company's current capital ratios.

ANSWER:

- (iv) Recommend two actions that could be taken to improve current capital ratios

ANSWER:

Show all work.

6.

(5 points)

(a) (2 points)

- (i) Identify and briefly describe the components of an actuarial appraisal value (AAV).

ANSWER:

- (ii) List the information typically included in an actuarial appraisal report.

ANSWER:

(b) (3 points) You are provided with the following information for a life insurance company:

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Base Solvency Buffer	1000	800	600	400	200	0
Surplus Allowance	50	40	30	20	10	0
Target Capital ratio			150%			
Pre-tax earned rate on assets supporting capital			4%			
Effective tax rate			25%			
Weighted average cost of capital			10%			

Assume there is no reinsurance.

Calculate the cost of capital. Show all work.

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

7.

(8 points) With respect to the taxation of individual life insurance policies under the Income Tax Act of Canada:

- (a) (1 point) Explain how an exempt test policy (ETP) would be constructed.

ANSWER:

- (b) (3 points) Critique each of the following statements:

A. *A policy is considered exempt if the accumulating fund of the policy is less than the accumulating fund of the ETP.*

ANSWER:

B. *Death benefits received on a non-exempt policy are fully taxable.*

ANSWER:

C. *Additional ETPs are deemed to be issued if the death benefit increases by any amount from the previous year.*

ANSWER:

7. Continued

(c) (4 points) You are given the following information for a UL policy:

- The policy is issued on January 1, 2020 to a female non-smoker, age 50.
- The policy has a level death benefit of 100,000.
- The cost of insurance is deducted at the beginning of the year
- Interest is credited at the end of each policy year at a rate of 5%.
- The policy is funded with a single premium of 10,000.
- The policy is considered to be an exempt policy.
- There are no policy loans.

	Rates / 1000 of death benefit	
Age	Cost-of-Insurance	Net cost of pure insurance (NCPI)
50	0.5	1.0
51	1.0	1.5
52	1.5	2.0

Assume that the policy is surrendered at the end of year 3.

Determine the taxable income of the policyholder at time of surrender.
Show all work.

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

8.

(11 points)

- (a) (5 points) You are given the following assumptions for a block of 10-year term life policies:

Issue Age	Duration	Mortality
40	9	0.0040
40	10	0.0050
40	11	0.0060
49	1	0.0035
50	1	0.0045
51	1	0.0055

The total cohort, exhibiting average mortality, contains the following groups:

- The proportion of the total cohort that persists is 8%
- The proportion of those additional lapses who lapse with average mortality is 12%
- The proportion of those whose lapsation has already been accounted for in the base mortality table is 5%

Calculate the mortality rates reflecting mortality deterioration at policy year 10 for a policy with issue age 40, under

- (i) VTP2

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

- (ii) Dukes-MacDonald 2 (DM2)

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

Show all work.

8. Continued

(b) (4 points) Critique the following statements with respect to lapse and mortality deterioration assumptions for a block of 10-year term:

A. *It is not necessary to adjust mortality deterioration for the skewness of lapses.*

ANSWER:

B. *Payment frequency and mode of payment have no impact on lapse rates, so can be excluded from the lapse study.*

ANSWER:

C. *Lapse rates on substandard mortality rating policies are likely to be lower than standard or preferred, as unhealthy lives are less likely to lapse. As a result, the actuary can assume substandard lapse rates are 50% of standard.*

ANSWER:

D. *Selective lapses are lapses whose mortality experience would be worse than that of newly selected lives.*

ANSWER:

8. Continued

(c) (2 points) You are given:

- The overall actual-to-expected ratio (AER) for life insurance mortality continues to exhibit a trend that is consistent with the company's mortality improvement assumption
- If COVID-19 pandemic-related life claims are excluded, the AER improves by 10%, which is significantly higher than the expected rate of mortality improvement
- At the onset of the pandemic, the company began rescinding selected life policies for which the responses to the application form were inconsistent with the insured's medical records

Assess the appropriateness of continuing to use the current best estimate mortality assumption. Justify your answer.

ANSWER:

9.

(10 points) You have been asked to help determine the opening value of the CSM for your company as of January 1, 2022, for the transition to IFRS 17, using the fair value methodology.

(a) (3 points)

- (i) Describe the two commonly used approaches for determining the fair value of a block of contracts.

ANSWER:

- (ii) Explain how each of the two approaches can be used to determine the CSM at transition.

ANSWER:

(b) (3 points) Assess whether each of the following items should be reflected when determining the fair value of a group of contracts:

- A. An outsourcing agreement with a third party which reduces the level of expected directly attributable maintenance expenses
- B. A lapse assumption based on the most recent industry study
- C. A mortality assumption based on a blend of the Company's internal data and the most recent industry study
- D. A mortality improvement assumption based entirely on the Company's own internal methodology

Justify your response.

ANSWER:

9. Continued

- (c) (4 points) You are provided with the following cash flow information for a group of contracts at the transition date (time period 0):

Time period	0	1	2	3	4	5
Best estimate cash flows		1,000	1,000	1,000	1,000	1,000
Risk adjustment		25	25	25	25	25
Non-Directly Attributable Expenses		50	50	50	50	50
Target Capital	1,500	1,000	800	600	300	0

You are given:

- IFRS 17 discount rate = 5%
- Hurdle rate = 10%
- Earned Rate on Surplus = 4%
- Tax rate = 25%
- Own Credit Risk = 0%

Determine the CSM at the transition date. Show all work.

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

****END OF EXAMINATION****