Exam ILALFMC

Life Financial Management - Canada

Date: Tuesday, November 5, 2024

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.

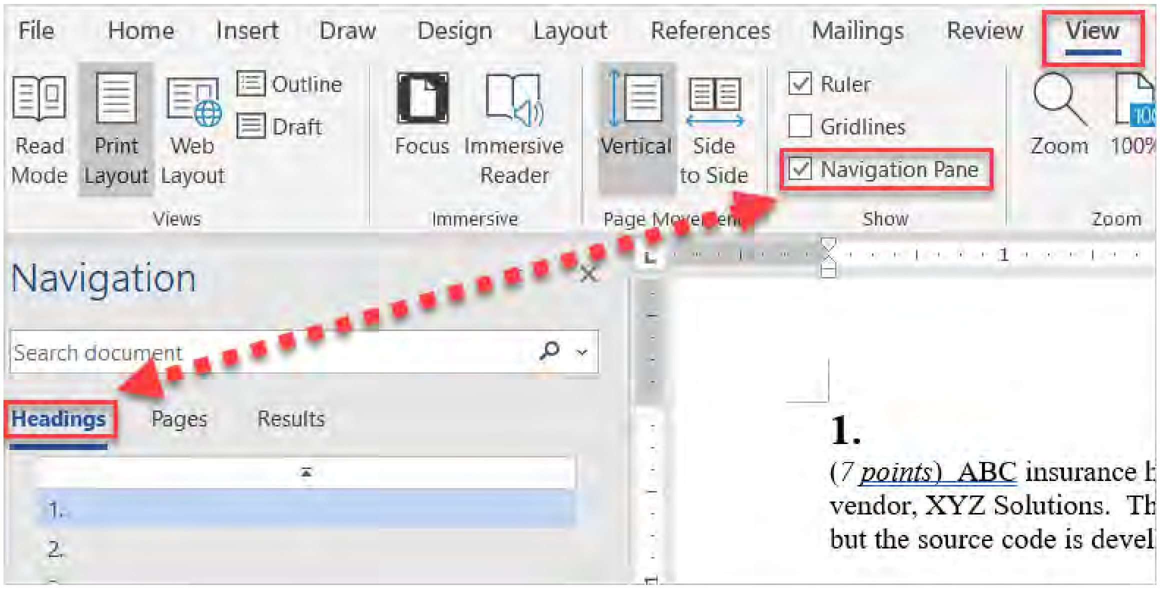
3. Prior to uploading your Word and Excel files, each file should be saved and renamed with your unique candidate number in the filename. To maintain anonymity, please refrain from using your name and instead use your candidate number.

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

Navigation Instructions

Open the Navigation Pane to jump to questions.

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



1.

(*9 points*) CBA Life offers the following participating product:

- Policyholder dividends are based on 50% of interest and mortality experience.
- The interest component is based on the investment return of the par fund subject to a 6% minimum return.
- Dividend payments are to remain at the guaranteed minimum level regardless of the investment returns on the par fund.

(a) (*2 points*) Describe the changes required to value the product using the Variable Fee Approach (VFA).

ANSWER:

(b) (*2 points*) Describe considerations in setting the risk adjustment for this product.

ANSWER:

(c) (*2 points*) Recommend whether an implicit or explicit approach should be used to estimate the present value of future cash flows for the underlying items shared with policyholders. Justify your response.

ANSWER:

(d) (*3 points*) You are given the following information for a different block of participating policies:

- The Risk Mitigation Option is not applied
- All assets are part of the underlying items
- The VFA measurement model is used

Additional financial information is provided in Excel.

Determine the CSM at the end of each period. Show your work.

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

2.

(*8 points)*

(a) (*2 points*) Compare and contrast Dukes-Macdonald (DM) and VTP2.

ANSWER:

(b) (*6 points*) DEF Life sells two 10-year renewable term products:

- Basic Term:
  - Maximum face amount of 500,000
  - Guaranteed issue
  - Renewal premium = 800% of the initial premium
  - Grace period of 30 days

- Premium Term
  - Maximum face amount of 2,000,000
  - Full underwriting
  - Renewal premium = 300% of the initial premium
  - Grace period of 100 days

Critique the following statements regarding selective lapsation and mortality deterioration for these products:

A. Selective lapses occur only at renewal and are highly skewed towards the end of policy year 10 and beginning of policy year 11.

ANSWER:

B. Policies with larger premium increases at renewal will have higher lapse rates. It is appropriate to assume that lapse rates increase linearly with the size of the premium increases.

ANSWER:

C. Mortality, mortality deterioration, and lapse assumptions should be set together for the entire term portfolio to increase credibility. Differences in product features are not expected to have a material impact on lapse rates or mortality.

ANSWER:

2. Continued

D. *Deaths during the grace period can be ignored when calculating mortality deterioration.*

ANSWER:

E. *The underlying base mortality table used to calculate mortality deterioration should be based on experience data from the term products.*

ANSWER:

F. *The shape of the underlying base mortality table does not affect how quickly the excess mortality wears off.*

ANSWER:

3.

(*9 points*)

(a) (*3 points*) Describe the objectives of capital adequacy for each of the following stakeholders with respect to a life insurance company:

(i) Policyholders

ANSWER:

(ii) Regulator

ANSWER:

(iii) Shareholders

ANSWER:

(iv) Company Management

ANSWER:

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

A. *Economic capital measures a life insurance company's capital needs based on the future economic risks that the life insurance industry faces. Economic capital is the amount required to cover a risk neutral distribution of risks with a high degree of certainty over the life of the policyholders.*

ANSWER:

B. *The Standard and Poor's Capital Adequacy Ratio is well known and understood industry measure that a life insurance company can use for its own economic capital models.*

ANSWER:

3. **Continued**

C. *Failing an economic capital calculation could result in a stage 1 early warning intervention by OSFI.*

ANSWER:

D. *Prior to approving a company's Own Risk and Solvency Assessment, OSFI will review it to understand its risk profile, methodology, assumptions, and quality of capital.*

ANSWER:

E. *Under International Capital Standard's (ICS) standard method for determining ICS 2.0 capital requirements for life insurers, insurance and market risks are quantified using stress tests, while credit and operational risk are quantified using factor-based approaches.*

ANSWER:

(c) (*2 points*) You are given the following information for a Canadian life insurance company:

Tier 1 Capital	500
Tier 2 Capital	200
Base Solvency Buffer	650
LICAT Total Ratio	123%
LICAT Core Ratio	88%
Internal Target Total Ratio	125%
Internal Target Core Ratio	70%

The life insurance company's Own Risk and Solvency Assessment determined its own capital needs to be 800.

Assess the life insurance company's ratios.

ANSWER:

4.

(*11 points*)

(a) (*3 points*) Critique each of the following principles as they apply to changes to adjustable policies:

(i) *Policy classifications should be established at issue and are not subject to change.*

ANSWER:

(ii) *The changes to adjustable policies should be based on underlying experience and not on projected future experience.*

ANSWER:

(iii) *It is never appropriate to cross-subsidize one policy cohort with another cohort.*

ANSWER:

(iv) *Past losses cannot be recovered through future adjustments.*

ANSWER:

4. Continued

(b) (*1 point*) Explain the analysis that the Appointed Actuary is required to prepare for Financial Condition Testing (FCT)

ANSWER:

(c) (*3 points*) The table below summarizes the FCT results at the end of the projection period.

Scenario	**Type**	**Statement value of assets**	**Statement value of liabilities**	**LICAT Total ratio**
Base	Base	150	80	140%
Pandemic	Solvency	110	100	75%
Increased mortality	Going concern	120	110	95%
Business Growth	Going Concern	200	130	200%

- The Company's target LICAT total ratio is 150%

For each scenario:

(i) Explain whether the results are satisfactory.

ANSWER:

(ii) Identify actions the Company might take to address unsatisfactory results.

ANSWER:

4. **Continued**

(d) (*4 points*)

(i) (*3 points*) Critique each statement from the Financial Condition Testing (FCT) report from the perspective of a peer reviewer:

A. *The Company sustained material mortality losses and assumed all claims in excess of the expected mortality level are due to COVID. Therefore, no changes were made to the base mortality assumption.*

ANSWER:

B. *Significant changes to the Income Tax Act are expected to materially impact the Company's income. This was not considered in the scenarios as the new rules will only be effective next year.*

ANSWER:

C. *The Company only tested the impact of the most severe risks.*

ANSWER:

(ii) (*1 point*) Explain OSFI's objectives in requiring a peer reviewer for the work of the Appointed Actuary

ANSWER:

5.

(*7 points*)

(a) (*3 points*) A US-domiciled insurance company is redomiciling to Bermuda. On the effective date, the assets have a book value lower than the market value. The conservatism in the US liability reserves has been reconciled to a risk margin using the cost of capital approach with a 10% cost of capital rate.

(i) Explain the impact on the assets on the statutory accounting balance sheet.

ANSWER:

(ii) Explain the impact on the liabilities on the statutory accounting balance sheet.

ANSWER:

(iii) Describe the implications for the surplus on the statutory accounting balance sheet.

ANSWER:

5. Continued

(b) (*4 points*) You are given the following information for a block of business in Bermuda:

Year	0	1	2	3	4	5
Best Estimate Liability (BEL)	900	800	720	560	340	0
Market risk free rate		4.5%	4.5%	4.5%	4.5%	4.5%

BSCR capital	Time 0
C_{Market}	40
$C_{P\&C}$	0
C_{LT}	10
C_{Credit}	0
Operational risk charge (%)	2%
Loss absorbing capacity adjustment	0

Correlation Matrix	C_{Market}	$C_{P\&C}$	C_{LT}	C_{Credit}
C_{Market}	1	0.25	0.125	0.125
$C_{P\&C}$	0.25	1	0.5	0.25
C_{LT}	0.125	0.5	1	0
C_{Credit}	0.125	0.25	0	1

Bermuda Solvency Capital Requirement (BSCR)	175%

Assume the following:

- The required capital is a constant ratio of BEL throughout the projection period.
- The risk margin is based on non-market risk.

(i) (*2 points*) Calculate the required capital at time 0. Show all work.

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

(ii) (*2 points*) Calculate the technical provision at time 0. Show all work.

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

6.

(*10 points*) JKL Life is setting IFRS17 discount rates for a newly acquired block of universal life (UL) policies.

(a) (*2 points*) Describe the impact on the illiquidity premium for each of the following UL product features:

(i) No surrender charges

ANSWER:

(ii) Market value adjustments

ANSWER:

(iii) Level cost of insurance (LCOI)

ANSWER:

(iv) Option to add term rider

ANSWER:

(v) Variable interest option with guaranteed minimum interest rate

ANSWER:

6. **Continued**

(b) (*4 points*) Critique the following statements related to applying the Fair Value method under IFRS 17 for the acquired block of UL policies:

A. *If this product generates a loss component at initial recognition, JKL should not expect a positive fair value CSM at acquisition since another potential buyer would experience similar losses.*

ANSWER:

B. *OSFI's Supervisory Target Capital Ratios should be used as the capital basis for determining fair value. OSFI's Minimum Capital Ratios would not be appropriate since they do not include any margin for risks not included in the LICAT guideline.*

ANSWER:

C. *The fair value for the reinsurance contracts held on this UL block of business may need to be determined using different assumptions since reinsurers are a different group of market participants than the direct writers.*

ANSWER:

D. *JKL can use their own assumptions for the risk adjustment in determining the fair value since they use a margin approach and their margins for this product are consistent with other insurers.*

ANSWER:

(c) (*4 points*)

Calculate the fair value CSM at acquisition under the Adjusted Fulfillment Cash Flow approach for the UL block using the information in the excel spreadsheet. Show all work.

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

7.

(*8 points*) QRS Life has a portfolio of segregated fund contracts.

QRS employs a static hedging strategy to reduce its exposure to unfavourable movement in the market. The hedging effectiveness is 95%.

Under IFRS17, these segregated fund contracts meet the definition of an insurance contract with direct participation features.

You are given:

- BEL: 4
- RA: 1
- CSM: 20

(a) (*1 point*)

You are given:

- OSFI has not approved QRS' hedging program for LICAT purposes.
- LICAT Total Gross Calculated Requirement (TGCR) = 26

Calculate the segregated fund Net Required Component at the supervisory level under the Base scenario. Show all work.

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

(b) (*7 points*) Before a price shock, the value of the hedging derivatives is 0. The fulfilment cash flows (FCF) and derivative values after equity price shock are given by:

- FCF = -410p/35 + 5
- Derivatives value = -12p

Where p = price shock

7. **Continued**

Calculate the contractual service margin after a -35% price shock (p = - 0.35)

(i) without the use of the risk mitigation exception

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

(ii) with the use of the risk mitigation exception, with hedge ineffectiveness reflected in CSM

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

(iii) with the use of the risk mitigation exception, with hedge ineffectiveness reflected in Profit/Loss

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

8.

(*7 points*)

(a) (*1 point*) Describe three methods used to value an insurance company.

ANSWER:

(b) (*3 points*) ABC Life is acquiring XYZ Life. XYZ has the following financial information:

Capital and surplus	50,000,000
Asset Valuation Reserve	2,500,000
Interest Maintenance Reserve (undiscounted)	1,500,000
Interest Maintenance Reserve (discounted)	1,000,000
Book value of assets	100,000,000
Market value of assets	90,000,000
Value of inforce business	75,000,000
Value of future business	40,000,000
Intrinsic value of brand name	20,000,000

Calculate the following:

(i) Adjusted book value

(ii) Embedded value

(iii) Actuarial appraisal value

(iv) Total company value

Show all work.

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

(c) (*3 points*) Explain the impact of the following items on the purchase price of XYZ by ABC:

(i) The level of confidence in the underlying assumptions used to calculate the value of inforce and value of future business

ANSWER:

8. **Continued**

(ii) The degree of urgency associated with the sale of XYZ

ANSWER:

(iii) Rising interest rate environment

ANSWER:

(iv) Concerns that XYZ's target market is becoming saturated or oversold

ANSWER:

9.

(*11points*) With respect to taxation of life insurance in Canada:

(a) (*4 points*) Explain how taxable reserves are determined for the following:

(i) Life Insurance policy

ANSWER:

(ii) Unearned premiums

ANSWER:

(iii) Unpaid claims

ANSWER:

(iv) Experience Rating refunds

ANSWER:

(b) (*5 points*) Critique the following statements for Canadian life insurance policies sold after 2017.

A. *The purpose of the exempt test is to distinguish between life insurance policies with significant cash values and policies with low cash values.*

ANSWER:

B. *A life insurance policy will qualify as exempt if, on each anniversary, the accumulating fund of the policy is less than the face amount of the policy*

ANSWER:

C. *A policy that fails the exempt test will immediately become non-exempt, but can be made exempt at any time by increasing the face amount*

ANSWER:

9. **Continued**

D. *The accumulating fund for a policy without cash values will always be 0*

ANSWER:

E. *The 250% test will fail if, at any point after the 10th anniversary, the death benefit of the policy increases by more than 250% over a 3-year period.*

ANSWER:

(c) (*2 points*) Determine the amount of taxable income attributable to the policyholder on surrender for the following UL policy issued on January 1, 2020 and surrendered on December 31, 2022.

	Premium	Fund Value at EOY	Surrender Charge	Net Cost of Pure Insurance
2020	500	510	5%	40
2021	300	850	4%	45
2022	300	1200	3%	50

Show all work.

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

****END OF EXAMINATION****