Exam ILALFVC

Life Finance & Valuation - Canada
AFTERNOON SESSION

Date: Thursday, November 1, 2018
Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 4 questions numbered 7 through 10 for a total of 40 points. The points for each question are indicated at the beginning of the question.

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 morning or afternoon session for Exam ILALFVC.

6. Be sure your essay 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.

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****BEGINNING OF EXAMINATION****
Afternoon Session
***Beginning with Question* 7**

7. (*8 points*) DEF Life has entered into identical 20% quota share yearly renewable term (YRT) reinsurance contracts with Reinsurers QRS and XYZ. Reinsurer QRS has a C credit rating. Reinsurer XYZ has a AA credit rating.

As this is the first reinsurance transaction at DEF Life, the actuary needs to change the financial statements to properly conform with IFRS standards.

(a) (*4 points*) Describe the necessary changes required to reflect these reinsurance contracts in the following:

(i) IFRS Balance Sheet

(ii) IFRS Disclosure Requirements

(iii) LICAT Credit and Operational Risk Capital

(iv) DCAT

(b) (*2 points*) During DCAT, the Chief Actuary has suggested that DEF Life test the following reinsurance related scenarios:

Scenario A: Reinsurer QRS reduces it quota share to 10% and Reinsurer XYZ increases its quota share to 30%.

Scenario B: Reinsurer QRS's credit rating changes from C to BBB.

Assess the impact to Gross and Net Liabilities under these scenarios

(c) (*2 points*) DEF is considering reclassifying a portfolio of "Held To Maturity" bonds as either "Available for Sale", "Held for Trading", or "Fair Value Option".

Assess the viability and impact on DEF's Balance Sheet and Income Statement for each option.

8. (*11 points*) QWX Life is a Canadian life insurance company.

QWX Life only sells two non-participating products, a Whole Life product in Canada and an Annuity product in the United States. You are given the following net present value of asset and liability cash flows discounted at the corresponding scenario discount rates:

LICAT Scenario	**Whole Life (sold in Canada)**	**Annuity (sold in the United States)**
Initial Scenario	100	30
Scenario 1	20	10
Scenario 2	15	20
Scenario 3	80	15
Scenario 4	70	5

(a) (*3 points*) Calculate the interest rate risk requirement for QWX under LICAT. Show all work.

8. **Continued**

(b) (*6 points*) You are given the following additional information for the Canadian Whole Life product:

Insurance Risk Components	Required Capital for Insurance Risk (IR)	Sum of Level and Trend Components for Insurance Risk (LT)
Mortality	1,000	800
Lapse Sensitivity	200	50

Other Risk Components	Required Capital for Risk Component
Credit Risk	120
Operational Risk	50
Market Risk	90

The correlation factors between these risks are:

	Mortality	Lapse Sensitive
Mortality	1.00	
Lapse Sensitive	0.25	1.00

Calculate the following for the Canadian Whole Life Product:

(i) Insurance risk requirement

(ii) Diversified risk requirement

(iii) Undiversified risk requirement

Show all work.

(c) (*2 points*) QWX Life ignores mortality improvement in the valuation of liabilities. Critique whether this practice is justifiable under LICAT.

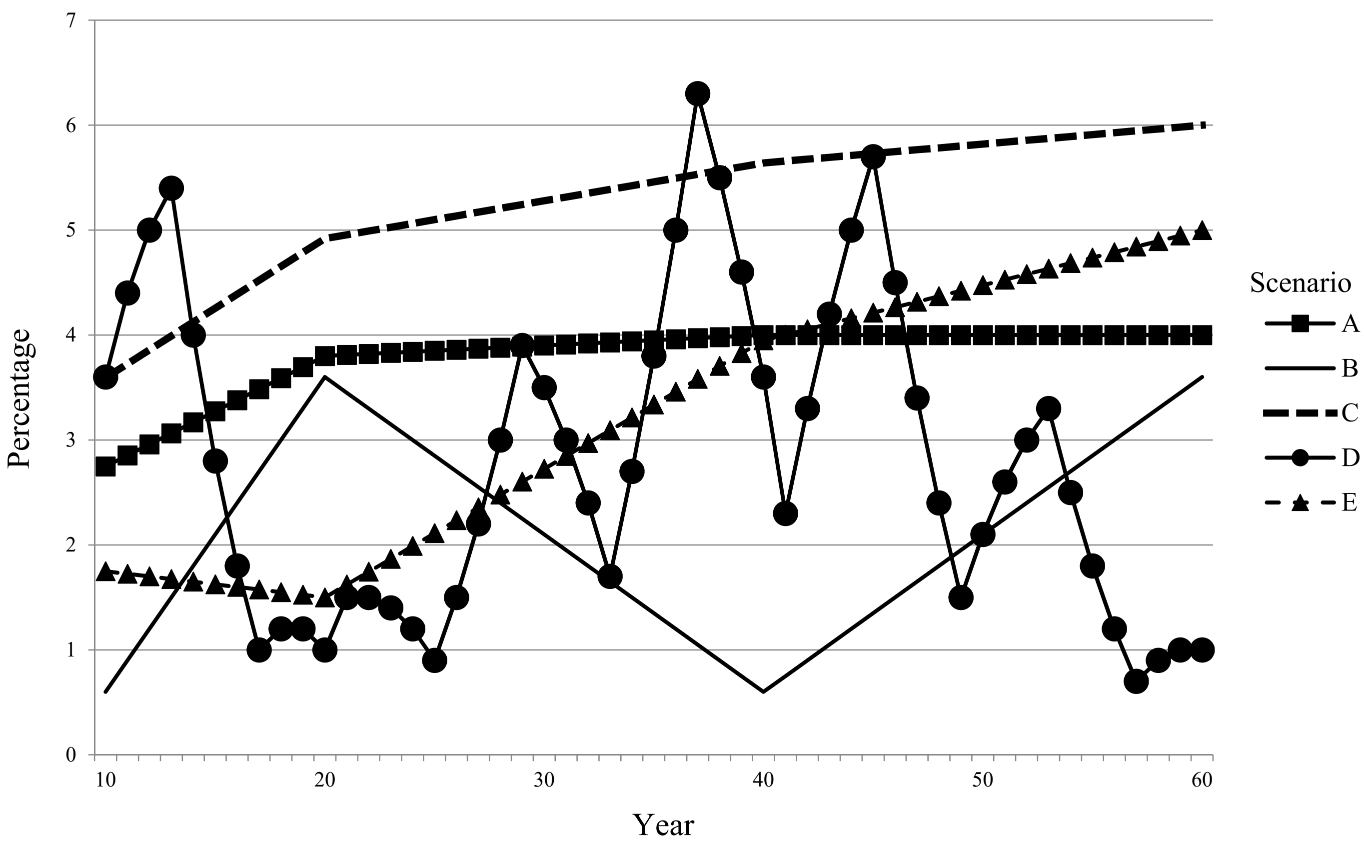
9. (*10 points*)

(a) (*6 points*) The Actuarial Standards Board (ASB) promulgated new ultimate risk-free reinvestment rates for 2019. Under these new rates, the short-term ultimate risk-free reinvestment rate-low will be equal to the long-term ultimate risk-free reinvestment rate-median.

Scenarios A through E are a sample of five risk free rate scenarios as prescribed by the CIA standards of practice, and using the new ultimate risk free reinvestment rates promulgated by the ASB.

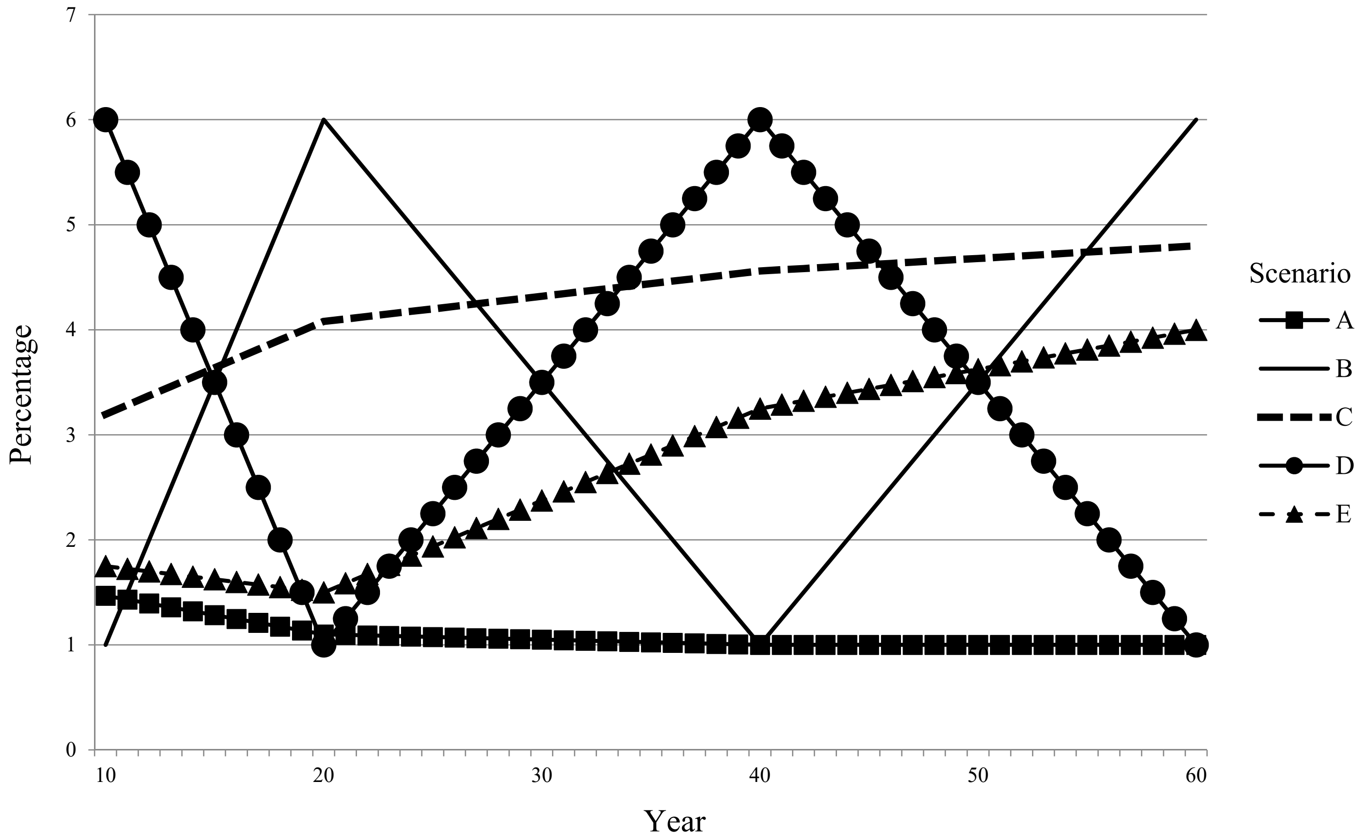
Two graphs are shown below, one representing short-term risk-free rates and one representing the long-term risk-free rates.

Graph X



9. **Continued**

Graph Y



(i) Determine which graph represents short-term rates and which graph represents long-term rates. Justify your answer.

(ii) Identify the corresponding CIA prescribed scenario for scenarios A through E in the graphs above. Justify your answer.

Question 9 continued on next page.

9. **Continued**

(b) (*2 points*) You have a block of business in the emerging market of the country of Catan. At the balance sheet date:

- 1.00 Canadian dollar is equivalent to 1.02 of Catan currency.
- The risk-free rates for Catan are within 0.10% of the risk free rates for Canada.

In developing the risk free rates for Catan, the following recommendation was made:

Continue to use the ASB's promulgated ultimate rate of returns (URR). Update the risk free implied forward rates using the exchange rate at the balance sheet date.

Critique the recommendation.

(c) (*2 points*) The investment policy for a block of business allows for a maximum mismatch of 6 months, with a target mismatch of 4 months. You are given the following historical mismatches:

Period	Duration mismatch in months
t	8
t - 1	4
t - 2	7
t - 3	5
t - 4	3
t - 5	5
t - 6	6
t - 7	5
t - 8	9

The following alternatives are being considered in determining the appropriate policy liabilities:

(i) Assume the mismatch will move to the target mismatch position over time.

(ii) Assume the mismatch will move to the maximum mismatch position over time.

(iii) Assume the mismatch will remain at the four-period average mismatch position.

Critique each alternative.

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10. (*11 points*)

(a) (*2 points*) Compare and contrast yearly-renewable-term (YRT) and modified coinsurance (Mod-co) reinsurance arrangements.

(b) (*5 points*) NRT Life is a Canadian life insurance company. The management team is considering entering into either a YRT or a Mod-co reinsurance agreement with HND Re.

You are given the following:

Policy Assumptions	
Issue Date	January 1, 2018
Plan of Insurance	Whole Life
Face Amount	500,000
Premium Rate per 1000	10
Annual Policy Fee	20
Reserves per 1000 as at December 31, 2018	0.75
First Year Commissions	90%
Premium Tax	1.50%
First Year Expenses	400

Ceding Company and Reinsurer Assumptions		
	NRT Life	HND Re
Initial Surplus	0	0
Investment Rate of Return	0	0

YRT Terms	
Amount Reinsured	350,000
Annual Cession Fee	15
2018 YRT Premium per 1000	0.60
Reserves per 1000 as at December 31, 2018	0.75
Mod-co Terms	
Ceded Percentage	70%
Expense Allowance	100%

- HND Re will allow NRT Life to retain the entire policy fee
- HND Re will also reimburse NRT Life for premium tax paid on the ceded premium

Assess which reinsurance arrangement is more effective at reducing the strain from new business on 2018 income. Show all work.

10. Continued

(c) (*4 points*) NRT Life is looking for surplus relief to improve the financials of its new Fixed Deferred Annuity product.

You are given:

- 50% Quota-Share
- 5% Expense Allowance

Pre Reinsurance Balance Sheet

Balance	Cedent	Reinsurer
(+) Cash	0	0
(+) Bonds	500	0
(–) Reserves	500	0
(+) Receivable/Payable	0	0
(=) Surplus	0	0

Construct a post reinsurance balance sheet for this block similar to the above, assuming the treaty structure is:

(i) Mod-Co

(ii) Mod-Co with Funds Withheld

(iii) Part-Co

****END OF EXAMINATION****
Afternoon Session

USE THIS PAGE FOR YOUR SCRATCH WORK