

Exam ILALFMU

AFTERNOON SESSION

Date: Wednesday, April 29, 2020

Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 4 questions numbered 6 through 9 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 ILALFMU.
6. Be sure your essay answer envelope is signed because if it is not, your examination will not be graded.

Canadian version of this exam is recognized by the Canadian Institute of Actuaries.

****BEGINNING OF EXAMINATION****

**Afternoon Session
Beginning with Question 6**

6. (11 points)

- (a) (4 points) EHP Life insurance company is adopting Principle Based Reserves (PBR) under VM-20. The same assumptions will be used for Life Insurance Illustration Model Regulation (LIIMR) testing as for PBR. Previous LIIMR testing demonstrated that all policies passed using the same modeling assumptions. EHP Life is changing its level term product to only have guaranteed premiums.

Critique the following statements:

- A. *All policies issued will pass LIIMR testing and no testing is required for the next certification since the assumptions are the same.*
- B. *The level term product will no longer require testing under the LIIMR and there no longer is a benefit of lower reserves by having non-guaranteed premiums under PBR.*
- C. *For modeling efficiency, the company will use the same models for PBR deterministic testing and for LIIMR testing.*

- (b) (3 points) You are given:

(in Millions)	Company X	Company Y
Products issued	Whole life	Whole life Universal life Term
Total Adjusted Capital	105	2,500
Authorized Control Level RBC	30	500
Total annual premium	45	290

- (i) Assess life insurance Company X and Y's ability to satisfy the conditions required to qualify for the small company exemption under VM-20 PBR requirements.
- (ii) Determine additional information necessary to make the full assessment.

6. Continued

(c) (4 points) You are given:

Calculated Reserve	5,000
Cash surrender value	2,600
PV of future benefits under anticipated mortality assumptions with margins	25,000
PV of future benefits under anticipated mortality assumptions without margins	21,500
PV of future expenses	950
PV of gross premiums	19,000
Reserve at CTE70	6,000
Reserve at CTE80	7,850
Reserve at CTE90	9,000

Determine the following values under VM-20:

- (i) Net premium reserve
- (ii) Deterministic reserve
- (iii) Stochastic reserve
- (iv) Minimum reserve
- (v) Tax reserve according to Tax Cuts and Jobs Act of 2017

Show all work.

7. (9 points) TTB Insurance Company is preparing for implementation of ASU 2018-12 for a block of noncancelable cancer insurance policies issued during 2016 and 2017.

You are given the following:

- Historical transaction information is unavailable
- This block has no DAC and has never undergone loss recognition
- TTB has no shadow reserves
- The investment portfolio rate (with margin) for all issue years was 6% at issue
- The same rate (including margin) was 5% on the transition date
- The yield on an upper-medium grade fixed-income instrument with a similar duration was 4% on the transition date

	2016 Issues	2017 Issues
Discounted at 6% to transition date		
PV Benefits	500,000	600,000
PV Gross Premiums	500,000	900,000
PV Maintenance Expenses	150,000	200,000
PV Claim Expenses	75,000	100,000
Discounted at 5% to transition date		
PV Benefits	575,000	700,000
PV Gross Premiums	550,000	1,000,000
PV Maintenance Expenses	170,000	230,000
PV Claim Expenses	85,000	115,000
Discounted at 4% to transition date		
PV Benefits	625,000	800,000
PV Gross Premiums	575,000	1,080,000
PV Maintenance Expenses	190,000	260,000
PV Claim Expenses	95,000	130,000
FAS60 balances on transition date		
Benefit Reserves	40,000	20,000
Maintenance Reserves	10,000	5,000

- (a) (6 points) Calculate the impact to each of the following as of the transition date:
- Retained earnings
 - Accumulated other comprehensive income

Show all work.

- (b) (3 points) Describe three required disclosures relevant to TTB's calculation of transition adjustments.

8. (8 points) Company XYZ offers a Single Premium Fixed Deferred Annuity product with the following features:

- Partial withdrawals up to 10% of account value each year
- Nursing home benefit that waives surrender charges upon nursing home incidence
- Death benefit that waives surrender charges upon death
- Life-contingent annuitization at a guaranteed interest rate

(a) (3 points) Identify each of the above benefits under Actuarial Guideline XXXIII (AG 33) as one of the two categories and one of the three plan types. Justify your answer.

You are given the following table with end of year values. The valuation interest rate for elective benefits is 4.5%. The interest rate for non-elective benefits is 5.0%.

Year	Partial Withdrawals	Expected Death Benefit Payments	Cash Surrender Value
1	1,000	50	48,000
2	0	100	48,800
3	1,000	150	49,300
4	0	200	50,000

(b) (3 points) Calculate the present value at time zero of an integrated benefit stream that ends in a full withdrawal at the end of year 4 including the given withdrawals and expected death benefit payments.

The company is considering adding a Customer Loyalty benefit to newly issued contracts. This benefit would pay 1% of the initial premium into the contract at the beginning of the 5th year.

To qualify for the Customer Loyalty benefit:

- The contract must be in force.
- The contract must not have experienced any transaction that reduced the account value prior to the end of the 4th year (including any form of withdrawal, annuitization or death).
- The contract owner must transfer into any currently available annuity product at the end of the 4th year (including the same product if then available).

(c) (2 points) Identify which of the two categories and which of the three plan types under AG 33 the Customer Loyalty Benefit would fall. Justify your answer.

- 9.** (12 points) PCLC is a US life insurance company that sells primarily single premium immediate annuity (SPIA). PCLC uses only the statutory capital basis to manage the risk profile. You are the head of enterprise risk management (ERM) and are interested in using a principles-based economic capital approach for managing the risks.
- (a) (1 point) Assess the treatment of the key risks for SPIA under each of the following:
- (i) Economic capital
 - (ii) Statutory risk-based capital
- (b) (3 points) Critique the following statements related to the capital needed for PCLC's SPIA product:
- A. *VaR is preferable over CTE because it recognize and allocates diversification benefits.*
 - B. *The liability runoff approach uses the preferred time horizon because of the importance of finding the amount of capital today that will provide sufficient protection for the lifetime of the portfolio.*
 - C. *The use of an economic valuation method provides the best assessment of risks across different companies and countries regardless of any regulatory or accounting framework.*
 - D. *If PCLC holds 400% of total RBC for its SPIA block the surplus will be sufficient to cover all the future benefits.*

9. Continued

The team provided you with the following information for the SPIA block:

Reserve and Capital	
Statutory Reserve	99
Statutory Capital for Asset Risk	2
Statutory Capital for Longevity Risk	1

Stochastic Simulation	Economic Liability discount at 5%	Economic Liability discount at 4.5%
1	109	111
2	108	110
3	107	109
4	106	108
5	105	107
6	100	102
7	101	103
8	102	104
9	103	105
10	104	106

- Stochastic mortality simulation is used for quantifying the longevity risk
- The economic reserve is the mean of all stochastic simulations
- Assets supporting SPIA earn the statutory interest rate of 5%
- PCLC enters into a total return swap that costs 0.5% to eliminate the asset risk
- The 90th percentile is the economic capital measure of the company
- Assume no correlation

(c) (5 points)

- (i) Calculate the economic capital for PCLC's asset and longevity risk. Show all work.
- (ii) Explain the relationship between the statutory capital and economic capital for asset risk.
- (iii) Explain the relationship between the statutory capital and economic capital for longevity risk.
- (iv) Recommend an appropriate risk capital approach using the total asset requirement for the SPIA product. Justify your response.

Question 9 continued on the next page.

9. Continued

(d) (3 points)

- (i) Construct a multi-tiered capital objective for PCLC assuming it takes a statutory view.
- (ii) Explain how the multi-tiered capital objective would be different if PCLC took an economic view.

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

USE THIS PAGE FOR YOUR SCRATCH WORK

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