SOCIETY OF ACTUARIES
Life Pricing

Exam ILALP

AFTERNOON SESSION

Date: Wednesday, April 26, 2017
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 ILALP.

6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d’examen pour la version française.

475 N. Martingale Road
Schaumburg, IL 60173-2226

Printed in the U.S.A.

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

7. (*10 points*) VML Life manages a block of a level-pay 10-year term life insurance products.

(a) (*3 points*)

(i) Describe three strategies to improve inforce post-level term profitability.

(ii) List advantages and disadvantages of each strategy.

VML introduces a new preferred term product with stricter underwriting criteria.

(b) (*2 points*) Describe the impacts the new underwriting criteria would have on the following:

(i) Mortality

(ii) Lapse

(iii) Expenses

7. Continued

(c) (*5 points*) You documented the assumption changes in the pricing report. Your supervisor reviewed the pricing report and drafted some comments.

Explain why you agree or disagree with each of the following:

A. *When describing the assumptions used, many assumptions are given as high-level approximations. This is completely inappropriate since all assumptions should be fully analyzed before submission.*

B. *The following pricing results were attached to the report to compare the new preferred term product to our existing term product:*

Metric	***Existing Term***	***New Preferred Term Product***
Profit Margin	*5%*	*8%*
IRR	*10%*	*7%*

Since our main objective is to use a pricing metric that can be easily compared to the rest of the VML's product portfolio, I suggest using "profit margin" and ignoring "Internal Rate of Return (IRR)" as our primary pricing metric.

C. *Instead of presenting only the expected value of the chosen metric, please supply a range based on sensitivity analysis.*

D. *When discussing risk mitigation strategies to reduce policyholder anti-selection, "Limit exposure through sales volume" was chosen. I believe a better strategy would be to provide a premium discount if the policy remains inforce after 10 years.*

E. *Peer review is missing and is needed prior to sign-off.*

8. (*11 points*) XYZ Life, a U.S. company, is adding a 10-year guaranteed minimum accumulation benefit (GMAB) rider to the current variable annuity product. You are given:

- Initial single premium is 1,000
- Risk free rate is 6% compounded continuously
- GMAB payoff is equal to the initial premium accumulated at 2% per annum in excess of the fund value
- Annual rider fee is 120 bps of fund value
- There are no cash flows other than the premium, rider fee, and GMAB payoff
- There are no decrements

The rider is priced using a set of 500 risk-neutral simulations which produce the following worst five results:

Scenario	**Fund Value at Time 10**	**Present Value of Rider Fees at Risk Free Rate**
496	793	634
497	611	494
498	610	502
499	512	439
500	440	379

(a) (*4 points*) Determine the present value of profits using CTE(99). Show all work.

(b) (*3 points*) Explain whether a risk-neutral or real-world modeling approach should be used for each of the following:

(i) Hedging

(ii) Forecasting

(iii) Capital management

8. **Continued**

(c) (*2 points*) XYZ will be hedging the rider and is concerned about deterioration in the accuracy of the hedge due to movements in the fund value.

(i) Describe gamma risk and basis risk.

(ii) Suggest strategies that could be used to mitigate the gamma risk and basis risk.

(d) (*2 points*) Describe challenges XYZ will face if it begins offering the variable annuity product in an international market.

9. (*12 points*) ANC Life plans to launch a new 5-year level term product to complement its existing 10-year level term product. You are given the following information:

	Current 10-Year Term	**New 5-Year Term**
Distribution Channel	Brokerage	Career Agents
Underwriting	Fully Underwritten with Preferred Classes	Simplified Issue
Conversion Privileges	Available for first 7 years	None

(a) (*6 points*) Due to time constraints management would like to use the same pricing assumptions for both the 10-year and 5-year term products.

Evaluate management's proposal and recommend changes to pricing assumptions where appropriate. Justify your answer.

(b) (*2 points*) Propose sensitivities to be performed on each of the key assumptions for the new 5-year term product.

9. Continued

(c) (*4 points*) Calculate the profit margin using the following information for the new 5-year term product:

Year 1 Cash flows

Paid at the Beginning of the year	
Premium (level for 5 years)	2,000
Commissions	825
Issue and Underwriting Expense	200
Paid throughout the year	
Maintenance Expense	50
Death and Surrender Benefits	65

Year 1 Reserve and Capital

Benefit Reserve (set up at the end of policy year)	850
Required Capital	40

Distributable Earnings (calculated at the end of policy year)

Year 2	95
Year 3	120
Year 4	170
Year 5	170

Other Information

Earned Interest Rate	5%
Interest on Required Surplus	8%
Tax Rate	0%

Show all work.

10. (*7 points*) ABC Life is evaluating the potential uses of predictive modeling to help manage the sales performance and profitability of its fully underwritten term life insurance business.

(a) (*2 points*) An analysis of the inforce policy data has revealed that some policy records have missing values for one or more model variables.

(i) Describe two common methods that could be used to handle these missing values.

(ii) Explain the limitations of each method.

(b) (*3 points*) A competitor has recently modernized its sales process on similar products. ABC has started to lose market share as a result and plans to streamline its underwriting practices to gain a competitive advantage.

(i) Explain how a predictive model could be used to support this initiative.

(ii) Propose criteria that ABC could use to evaluate the success of new underwriting practices.

(c) (*2 points*) ABC uses traditional experience study methods to set lapse assumptions for this business based on policy duration only.

(i) Outline the potential benefits of using a predictive model for lapse assumptions.

(ii) Describe the challenges that may arise with the implementation of a predictive lapse model.

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

USE THIS PAGE FOR YOUR SCRATCH WORK

USE THIS PAGE FOR YOUR SCRATCH WORK