SOCIETY OF ACTUARIES
Life Pricing

Exam ILA LP

AFTERNOON SESSION

Date: Wednesday, October 30, 2013
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 since 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 ILA LP.
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.

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Exam ILA LP-Front Cover

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

7. (*12 points*) With regard to substandard term life business:

(a) (*3 points*) Describe the types and uses of substandard ratings.

(b) (*6 points*) Discuss modifications that should be made to pricing assumptions when modeling substandard life policies.

(c) (*1 point*) Explain the advantages and disadvantages of not paying agent commission on the additional substandard premium.

(d) (*2 points*) Evaluate Marketing's proposal to offer a return of the substandard premium if the policyholder is still alive at time of expiry of the Term policy at no cost.

8. (*5 points*) RKA Life currently sells a fully-underwritten non-renewable 5 year term (T5) product. RKA wants to move to simplified underwriting to save time and cost to issue. The competition limits your ability to increase premiums by more than 5%.

(a) (*2 points*) For issue age 40 on 250,000 of face amount, you are given:

	Current	Simplified
Annual Premium	500	
Upfront Expenses	600	350
A_{40}	0.0065	0.008
$\ddot{a}_{40}$	4.45	4

Recommend whether RKA should pursue this strategy. Show your work.

(b) (*1 point*) Assess the risks of adopting this simplified underwriting approach under an independent broker distribution system.

(c) (*2 points*) RKA wants to add a conversion option to the T5 product.

(i) Describe three possible methods to price for the additional cost of this conversion option.

(ii) Recommend one of the three methods assuming RKA wants to cover the future cost of excess mortality.

9. (*11 points*) STM Life has been selling critical illness insurance for five years.

(a) (*2 points*) Compare the product features and pricing assumptions for critical illness versus traditional term life insurance.

(b) (*4 points*) You are given the following data as it pertains to Economic Required Capital (ERC):

	Best Estimate	Shocked +30% Morbidity	Shocked +/- 50% Lapse
PV of Premiums	5,365,000	4,986,000	5,398,000
PV of Benefits	4,854,000	5,522,000	4,971,000
PV of Expenses	150,000	135,000	155,000
Operational Risk Charge	1%		
Investment Mismatch Charge	2%		
Diversification Factors			
Morbidity	80%		
Lapse	85%		
Operational	70%		
Investment Mismatch	X%		
Economic Required Capital	938,083		

Assume there are no requirements for contagion risk for morbidity and lapses.

Calculate the diversification factor for investment mismatch. Show all work.

9. Continued

(c) (*5 points*) STM would like to blend its own company incidence rate experience with that of a recently published industry morbidity study. The following are the results of the morbidity studies.

Industry Incidence Experience Data				
	A/E Ratios			
Underwriting Class	**Male**	**Female**	**Total**	
Standard	110.4%	115.6%	111.4%	
Preferred	60.3%	58.8%	59.9%	
Total	90.1%	94.0%	90.9%	

Company Incidence Experience Data						
	A/E Ratios			Number of Claims		
Underwriting Class	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Standard	98.9%	90.0%	95.9%	275	129	404
Preferred	66.1%	70.5%	67.7%	146	88	234
Total	84.4%	80.9%	83.2%	421	217	638

Assumptions:

- Industry data is fully credible
- Claims distribution is Simple Poisson
- Error margin (r) = 3%
- Confidence level (p) = 90%
- Number of claims needed for full credibility = 3007

Calculate the blended actual to expected (A/E) incidence ratio for male preferred and female preferred using the Normalized Method for credibility. Show all work.

10. (*12 points*) CAL Life is launching a single premium Equity-Indexed Universal Life (EIUL) product for the first time.

(a) (*1 point*) List the steps necessary to establish experience assumptions with respect to EIUL product features.

(b) (*2 points*) Compare and contrast static and dynamic hedges with respect to index-based interest funding.

(c) (*7 points*) You are given:

- 100% of the premiums are deposited into an indexed account.
- Interest is credited annually on the policy anniversary.
- Interest is credited on the average of the semi-annual indexed account values.
- Interest credited is based on the one year growth rate of the BubbleGum Index floored at 0%, up to the current cap of 10%.
- The current BubbleGum Index is at 1,000.
- Risk free rate is 4%.
- Annual volatility is 18%.

For a specific contract you are given:

- Single premium is 1,183.
- Face Amount is 50,000.
- Level death benefit (Option 1)
- Cost of insurance charge is 2.5 per 1,000 of Net Amount at Risk paid semi-annually at the beginning of the period.
- Administrative charge and commission = 0

CAL is facing downside market risk and is proposing to fund the interest credited by using a static hedge.

10. Continued

(i) (*3 points*) Design a one-year static hedge for the interest credited on this contract, using one-year call options. Assume a net earned rate of 5%.

(ii) (*1 point*) Illustrate the payoff of your hedge design.

(iii) (*3 points*) For a Standard normal distribution $N(0,1)$:

X	$\Phi(x)$	$\Phi(-x)$
0.13	0.55	0.45
0.22	0.59	0.41
0.31	0.62	0.38
0.40	0.65	0.35
0.66	0.75	0.25
0.84	0.80	0.20

Calculate the gain/loss from the hedge. Show all work.

(d) (*2 points*) With respect to EIUL interest funding:

(i) (*1 point*) Describe possible scenarios which would impact your ability to hedge the interest funding.

(ii) (*1 point*) Propose two potential solutions with respect to EIUL product features to mitigate these scenarios.

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

USE THIS PAGE FOR YOUR SCRATCH WORK