Life Finance & Valuation – U.S.

Exam ILALFVU

AFTERNOON SESSION

Date: Thursday, May 2, 2019
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 ILALFVU.
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.

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BEGINNING OF EXAMINATION
Afternoon Session
Beginning with Question 7

7. (*8 points*)

(a) (*4 points*) You are given the following information from a company's statutory annual statement:

	Current Year
Annuity considerations	50
Commissions	50
Death benefits	15
Dividends to stockholders	10
Dividends to policyholders	15
Expenses	25
Federal income taxes excluding taxes on capital gains	16
Increase in reserves	10
Net investment income	35
Premiums	100
Surrender benefits	5
Net realized capital gains less capital gains taxes	3
Change in net unrealized capital gains	12

Assume the amount of capital and surplus at the end of the prior year is 100.

(i) Calculate net income for the current year.

(ii) Calculate the amount of capital and surplus at the end of the current year.

Show all work.

7. Continued

(b) (*4 points*) You are given the following information from a company's five-year financial plan:

Profit Center	Five-Year ROE	Beginning Equity	Ending Equity	Equity Growth Rate
A	12%	50	81	10%
B	17%	186	426	18%
C	6%	32	64	15%
Total Company	15%	268	561	16%

Assume:

- The company's cost of capital is 10%.
- The company wants to maintain a policy of dividend payouts to shareholders equal to 2% of equity.
- The company wants to maintain a policy of supporting all growth through earnings.

(i) Assess the appropriateness of the financial plan at the total company level.

(ii) Make recommendations for improving the plan.

8. (*9 points*) You are given the CRVM reserve methodology with the following modifications:

- the first-year net premium is double the amount produced by the CRVM methodology
- the renewal net premium is set so that the present value of future benefits equals the present value of future net premiums at issue

You are given the following information for a 5-year term policy issued in 2016 to a 65-year-old male:

- Face amount: 1,000
- Annual premium: 45
- Premium is paid at the beginning of the policy year
- Deaths occur at the end of the policy year
- The same valuation basis is used for basic reserves and deficiency reserves
- Valuation interest rate: 3.5%
- Valuation mortality rates:

$1000q_{65}$	16.85
$1000q_{66}$	26.91

- Valuation net single premiums:

$1000A^{1}_{65:\overline{5}\rceil}$	178.73
$1000A^{1}_{67:\overline{3}\rceil}$	154.24

- Valuation annuity factors:

$1000\ddot{a}_{66:\overline{4}\rceil}$	3.61
$1000\ddot{a}_{67:\overline{3}\rceil}$	2.77

(a) (*6 points*) Calculate the reserve for this policy at the end of policy year 2. Show all work.

(b) (*3 points*) Assess whether this modified methodology will meet statutory valuation requirements. Justify your answer.

9. (*12 points*) You are given the following calculation of DAC without reflecting the SOP 03-1 liability for a Universal Life product with a No-Lapse Guarantee (UL-SG):

Year	Discount Factor (3%)	Deferrals BOP	EGPs EOP	Amortization Ratio (k)	DAC Balance EOP	DAC Amortization
1	0.9709	3,750	1,595		2,758	1,104
2	0.9426	0	1,497		1,805	1,037
3	0.9151	0	1,400		889	970
4	0.8885	0	1,323		0	916
PV		3,750	5,416	69.2%		

You are also given the following with respect to the SOP 03-1 liability calculation:

Year	Excess Death Benefits EOP	Assessments EOP	Benefit Ratio	SOP Balance EOP
1	471	1,834		1,637
2	742	1,722		2,924
3	1,883	1,610		2,980
4	4,819	1,521		0
PV	7,162	6,228	115.0%	

Assume a 3% credited rate every year.

(a) (*5 points*) Calculate the DAC balance at the end of year 2. Show all work.

(b) (*3 points*) Describe how the values in each column of the tables given above would change if the credited rate is increased without a change in investment strategy.

(c) (*4 points*) Describe how the GAAP valuation of this product would be different under FASB's Targeted Improvements with respect to the following:

(i) DAC balance and amortization

(ii) SOP 03-1 balance and benefit ratio

10. (*11 points*) PHI Life has two blocks of universal life secondary guarantee (ULSG) policies: one block subject to Actuarial Guideline 38 (AG38) Section 8E and one block subject to VM-20. PHI is considering using captive reinsurance to provide relief from the surplus strain of AG38 reserves.

(a) (*2 points*) Describe the conditions specified in Actuarial Guideline 48 that PHI must satisfy to receive a reinsurance reserve credit.

(b) (*4 points*) You are given the following information for a single policy in the AG38 block:

	Valuation Date
Basic reserve with "specified premiums" equal to minimum gross premiums	5,000
Deficiency reserve with "specified premiums" equal to minimum gross premiums	1,500
Premiums paid in excess of minimum gross premiums	1,000
Cumulative premiums to fully fund the secondary guarantee less the cumulative premiums requirement	3,720
Net single premium for the remainder of the secondary guarantee period	7,000

Assume:

- The policy has a cumulative premium design that satisfies the safe harbor requirements of AG38 Section 8E
- No surrender charges

Calculate the AG38 Section 8E reserve for the policy. Show all work.

(c) (*3 points*) Compare and contrast the VM-20 net premium reserve, deterministic reserve and stochastic reserve in the following areas:

(i) Methodology

(ii) Non-prescribed assumptions

(iii) Economic scenarios

(iv) Discount rate

10. **Continued**

(d) (*2 point*) You are given the following information from the VM-20 model:

Net premium reserve	600
Stochastic reserve	800
Deterministic reserve components (pretax)	
PV future benefits	1200
PV future commissions and expenses	50
PV future gross premiums and/or other applicable revenue	250
PV net reinsurance cash flows	50
Interest maintenance reserve	20

Assume:

- Corporate tax rate = 21%
- No policy loans
- No derivative liability programs

Calculate the VM-20 reserve. Show all work.

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

USE THIS PAGE FOR YOUR SCRATCH WORK