SOCIETY OF ACTUARIES
Life Finance & Valuation - Canada

Exam ILA LFVC

AFTERNOON SESSION

Date: Thursday, October 31, 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 LFVC.
6. Be sure your essay answer envelope is signed because if it is not, your examination will not be graded.

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BEGINNING OF EXAMINATION
Afternoon Session
Beginning with Question 7

7. (*10 points*)

(a) (*4 points*) Describe the special considerations that should be made in determining non-economic best estimate valuation assumptions to be used in the valuation of Universal Life products.

(b) (*6 points*) You are given the following information for two blocks of Universal Life policies:

	Block A	**Block B**
Underwriting	Simplified underwriting for lower face amounts	Thorough preferred underwriting
Average face amount	50,000	500,000
Surrender charges	25% of fund until end of year 10; none thereafter	100% of minimum premium to year 15; grading to zero at year 20
Compensation	75% of premium in year 1; 5% in years 2 to 5; 0.10% asset-based compensation thereafter	10% of premium for 20 years; 0.50% asset-based thereafter
Persistency bonus	None	10% of premiums paid during the first 10 years payable at the end of year 20
COI structure	YRT	Level
Investment choices	• 12 different foreign and domestic equity funds • 3, 5, and 10-year GIC funds • Administration charge of 500 for investment switches • No Market Value Adjustment (MVA) on investment switches	• One domestic equity fund • One fund with portfolio rate tied to Government of Canada Long-term Bond Yields • One Money Market fund • No administration charge for investment switches • Full MVA on investment switches
Issue ages	0 to 60; all single policies	40 to 80; 30% of business Joint Last-to-Die policies
Years of issue	1985-1987	2005-2007
Availability of premium holiday	Only available as long as fund greater than 10 times the current year COI; otherwise policy lapses	Available any time after year 10 as long as cash surrender value is greater than zero
Marketing strategy and associated funding level	Sold for investment and/or tax deferral purposes with maximum funding	Sold for death benefit protection with minimal funding

Contrast current best estimate valuation assumptions for mortality, expenses, and lapses between the two blocks. Justify your answer.

8. (*10 points*) Until the end of 2012, your company sold term life insurance in Canada with two underwriting classes: Standard and Preferred. In 2013 it began selling the product with three underwriting classes: Standard, Elite and Super Elite. The underwriting criteria for the Standard class did not change, while those who previously would have fallen into the Preferred class have been split into Elite and Super-Elite.

You have been given the task of determining the mortality assumption for the 2013 issued business to use in the 31 December 2013 valuation. You only have company experience split under the old underwriting classes which is considered fully credible.

You are given the following information:

- The block of business is not reinsured.
- 20% of the applicants who would have previously been accepted in the old Preferred class will now qualify for the new Super-Elite class.
- It is expected that those in the new Super-Elite class will have a 30% lower mortality rate than those in the old Preferred Class.
- Company's best estimate for expected mortality and life expectancy in 2013 for the Preferred Class

$$q_{[35]} = 6 \,/\, 1000 \qquad e_{[35]} = 51.5$$
$$q_{[35]+1} = 7 \,/\, 1000 \qquad e_{[35]+1} = 51.4$$
$$q_{[35]+2} = 8 \,/\, 1000 \qquad e_{[35]+2} = 51.3$$

where $e_{[x]+t}$ is the curtate expectation of life for an age $x+t$ underwritten at age x.

Your chief actuary recommends using the highest end of the mortality margin assumption recommended by the CIA

(a) (*2 points*) Describe the considerations to take into account when calculating the mortality rates under the new underwriting classes.

(b) (*3 points*) Determine the valuation mortality rate in policy year 3, including margins and mortality improvement considerations, to use in the 31 December 2013 valuation for an Elite policy issued to a 35 year old on 1 January 2013, as per the most recent memorandum from the Actuarial Standards Board.

8. **Continued**

(c) (*3 points*)

(i) Describe instances where the CIA recommends using the high end of the mortality margin assumption.

(ii) Critique the appropriateness of the chief actuary's recommended mortality margin.

(d) (*2 points*) Assess the appropriateness of using these Canadian term life Standard class valuation mortality rates including margins to calculate Canadian reserves for the following blocks of business:

(i) Payout Annuities sold in Canada

(ii) Non-reinsured term insurance sold in the U.S.

(iii) 100% reinsured term insurance sold in Canada

9. (*9 points*)

(a) (*3 points*) Explain the implications for policyholder taxation purposes brought about by the 1996 legislation and regulations.

(b) (*6 points*) Using the following year-end 2012 financial information for a particular non-par block of insurance policies, determine:

(i) The total reserve for policyholder taxation purposes

(ii) The maximum tax reserve that may be reported for 2012 for income tax purposes

	Pre-1996	**Post-1996**	**Combined**
Total 1.5 FPT reserve using premium calculation assumptions	137,000	460,000	597,000
Total 1.5 FPT reserve using cash value calculation assumptions	132,000	420,000	552,000
Total positive regulatory policy reserves (gross)	150,000	450,000	600,000
less reinsurance offset	(15,000)	(45,000)	(60,000)
Total negative regulatory policy reserves (gross)	(5,000)	(30,000)	(35,000)
less reinsurance offset	500	3,000	3,500
Total regulatory policy reserves (gross)	145,000	420,000	565,000
less reinsurance offset	(14,500)	(42,000)	(56,500)
Projected Investment Income Tax included in policy reserve	2,500	4,000	6,500
Policy Loans	2,000	6,000	8,000
Unearned Premium Reserves	1,000	2,000	3,000
Unpaid claims			
Incurred but Not Reported (IBNR)			
Gross	1,500	1,800	3,300
Ceded	(200)	(400)	(600)
Claims Received but Unpaid	800	1,100	1,900
Present Value of Future Income Tax	9,000	25,000	34,000
Experience Rating Refund Reserve (on annual premium of 10,000)	2,000	2,200	4,200

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10. (*11 points*) XYZ Life is evaluating a block of identical index linked universal life policies issued on 1 January 2008 by ABC Life. You are given:

- Interest is credited based on a defined investment strategy of 60% bonds and 40% equities with a minimum credited rate floor.
- The actual investment strategy is 70% equities and 30% long term bonds.
- Assets backing this block of policies have C$50M invested in bond funds and C$120M invested in equities.
- 100% MCCSR for bond fund assets is C$5.75M.

	Equities		
	Standard Deviation		
Prior 52 Weeks	Earned	Credited	Correlation
2011Q4	1.2%	1.3%	97.4%
2012Q1	1.8	1.8	98.7
2012Q2	2.1	2.1	99.0
2012Q3	1.5	1.4	98.1
2012Q4	1.5	1.5	98.3

(a) (*1 point*) List the qualifying characteristics and conditions to use the Index Linked Products MCCSR calculation.

(b) (*2 points*) For this block of policies, calculate 100% of the MCCSR C-1 component as at 31 December 2012.

(c) (*3 points*) Provide a brief description of each of the following methods for calculating economic capital.

(i) Risk Neutral Basis

(ii) Real World Basis

(iii) Stress Test Basis

10. Continued

There has been a general market downturn since the original product launch. You are given the following information to be used in parts (d) and (e):

- Equity fund returns have dropped from 10% to 8%
- Bond fund returns have increased from 6% to 7%
- Total asset holdings are now C$100M equities and C$60M bonds.
- The value of the guarantee is C$35M if the current investment strategy is maintained
- Capital sensitivity results

	Change in Asset Return Assumption	Change in Capital (as a percentage of starting asset value)		
		100% MCCSR	Real World	Risk Neutral
Equity Return	–1%	–2%	+3%	+7%
Bond Fund Return	+1%	+2%	–2%	–5%

- Starting economic balance sheet

	Total liabilities	Total Assets	Equities	Bonds
Unit Reserve	125	125	88	37
Value of Guarantee	5	5	4	1
Capital	40	40	28	12
Total	170	170	120	50

(d) (*2 points*) Calculate the estimated change in capital for:

(i) 200% MCCSR

(ii) Economic Capital on a Risk Neutral Basis

(iii) Economic Capital on a Real World Basis

(iv) Economic Capital on a Stress Test Basis

(e) (*3 points*) Given the economic environment changes, management has asked if the current investment strategy should be maintained. Recommend the go-forward investment strategy for this block of UL policies. Justify your answer.

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

USE THIS PAGE FOR YOUR SCRATCH WORK

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