SOCIETY OF ACTUARIES
Life Finance & Valuation – U.S.

Exam ILALFVU

MORNING SESSION

Date: Thursday, October 30, 2014
Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 100 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 40 points).

   a) The morning session consists of 7 questions numbered 1 through 7.

   b) The afternoon session consists of 4 questions numbered 8 through 11.

   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.

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BEGINNING OF EXAMINATION
Morning Session

1. (*9 points*) Pelican Life is a mid-size company with a long history of specializing in traditional life products with a relatively small but stable customer base. In recent years it has been trying to expand its business by entering the Universal Life (UL) market.

(a) (*5 points*)

(i) (*1 point*) List the categories of reserve reviewing techniques.

(ii) (*2 points*) Recommend two appropriate reviewing techniques for Pelican Life's business and justify your choices.

(iii) (*2 points*) Pelican recently began issuing a disabled life product. You have been asked to verify the reserves for this block of business and are given the following claims data:

Incurred Month	Claims Paid as of Dec. 31	Cumulative Completion Factor
Jul	260	1.00
Aug	220	1.20
Sep	250	1.50
Oct	150	2.00
Nov	100	2.60
Dec	80	3.20

Calculate the total claims reserve as of Dec. 31. Show all work.

(b) (*2 points*) Pelican Life is now subject to the requirements of the Sarbanes-Oxley Act (SOX). The company has provided you with the following information about their practices:

Practice A: *Each year, Pelican's internal audit department assesses the effectiveness of the company's internal controls over financial reporting. The manager of Pelican's audit department signs a statement attesting that no controls failed.*

1. Continued

Practice B: *In the actuarial department, errors in the actuarial valuation systems are the main risk to accurately determining reserves. Controls will be placed on the programs and spreadsheets used in calculating reserves.*

Critique each of these practices.

(c) (*2 points*) Pelican is domiciled in Canada and sells business in both Canada and the U.S. Recently, Pelican began listing its shares on the New York Stock Exchange in order to take advantage of the U.S. capital markets. Pelican has a large number of policies that were issued many years ago backed by long term assets.

(i) Outline the procedure for obtaining the value of the long term assets under Fair Value Accounting.

(ii) Explain how the implementation of International Accounting Standards would benefit Pelican.

2. (*9 points*) XYZ Life is reviewing the impact of the accounting changes from the proposed IFRS accounting standards using the June 2013 releases of the IASB and FASB Exposure Drafts.

(a) (*2 points*) Analyze how each of the following insurance contracts is measured under the proposed IFRS accounting standards using the June 2013 releases of the IASB and FASB Exposure Drafts.

(i) Variable Deferred Annuity.

(ii) Non-Proportional Life Reinsurance Ceded.

(iii) Annually Repriced Hospitalization Individual Health Contract.

(iv) Extended Auto Warranty.

(b) (*7 points*) XYZ Life has a 5-year term product with the following characteristics:

- Level premiums for the first 5 years
- After the first 5 years, policyholder can renew at annual rates subject to a guaranteed maximum premium

(i) (*4 points*) Critique the discount rate with reference to the proposed standards:

Current risk free rate: 10 Year U.S. Treasury	3.00%
Market risk for expected credit losses	+1.25%
Non-performance ("own credit") risk	+ 1.10%
Discount Rate	= 5.35%

(ii) (*3 points*) Identify which of the following statements are false and recommend changes to make the statements true.

Statement 1: *The renewals after the 5-year term are considered beyond the contract boundary since the company can re-assess the risk and set new premiums.*

Statement 2: *Because the coverage period of the insurance contract is not one year or less, the company should use the Premium Allocation Approach for this product.*

Statement 3: *As the company receives cash for premiums, the liability will increase.*

3. (*8 points*) Your company is considering an acquisition and is given the following output of the inforce business from the company's valuation models. No capital contributions or shareholder distributions were included.

Time (t)	Surplus at time t	Required Capital at time t	After-tax return on assets supporting surplus
0	10,000	4,000	4.00%
1	13,000	3,500	4.00%
2	14,000	3,500	4.00%
3	14,500	3,000	4.00%
4	15,000	3,000	4.00%
5	16,000	2,500	4.00%
After $t = 5$, inforce business has all run off			

(a) (*1 point*) Describe items that should be considered to perform an actuarial appraisal for the potential acquisition.

(b) (*4 points*) Calculate the following assuming a risk discount rate of 10%:

(i) Present Value of Cost of Capital

(ii) Present Value of After Tax Statutory Book Profits

(iii) Inforce Business Value

Show all work.

(c) (*2 points*) Assume:

- A portion of the required capital is funded by a debt level of 2,000 at all times *t*.
- A constant after tax cost of debt of 6%.

Calculate the Present Value of Cost of Capital. Show all work.

(d) (*1 point*) Calculate the Embedded Value assuming that the current book value of assets equals the realizable market value. Show all work.

4. (*10 points*)

(a) (*3 points*)

(i) (*1 point*) For equity indexed annuities, list the computational methods for U.S. Statutory reserves that are considered to be acceptable interpretations of the Commissioners Annuity Reserve Valuation Method (CARVM).

(ii) (*2 points*) Explain the hedging requirements associated with each of the computational methods listed above.

(b) (*7 points*) You are given the following for a portfolio of equity-indexed annuities:

- 1,000 policies were sold on January 1, 2014
- Single premium of 10,000 for each policy
- Policies mature at the end of two years
- Commission equals to 3% of premium
- No expenses
- No surrenders, withdrawals or deaths occur prior to maturity
- 2 year point-to-point interest crediting
- Interest credits are based on the performance of the S&P 500 with a 100% participation rate and a 3% floor
- The embedded derivative is hedged with call options
- Fair value of call options always equals fair value of the embedded derivative and is 400,000 at issue
- Assets backing the host contract earn interest at an annual rate of 6%

Calculate the pre-tax profit for calendar years 2014 and 2015 under U.S. GAAP, assuming the commission is entirely deferrable and the discount rate for DAC amortization is 4%. Show all work.

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5. (*10 points*) DSL is a U.S. life insurance company in runoff mode. DSL prepares its financial statements in accordance with U.S. Statutory Accounting Principles. As of December 31, 2012, only two policies remain in force, and only two assets remain in the asset portfolio:

Policy	**Reserve**		**Net Annual Valuation Premium**
	31 Dec 2012	**31 Dec 2013**	
Participating Whole Life Insurance	14,000	16,800	2,500
Single Premium Fixed Deferred Annuity	30,000	N/A	N/A

Asset	**Statement Value (including Accrued Interest)**		**Scheduled Maturity Date**
	31 Dec 2012	**31 Dec 2013**	
5 Year Bond	20,000	20,000	30 Sep 2016
10 Year Bond	40,000	N/A	30 Jun 2019

Transactions during 2013 consisted of the following:

- Participating Whole Life Insurance Policy
  - Premium received from policy owner: 3,000
  - Commission paid to sales agent: 60
  - Dividend paid to policy owner: 200

- Single Premium Fixed Deferred Annuity Policy
  - Policy owner surrendered the policy
  - Surrender value: 29,000
  - Reserve at time of surrender: 30,400

- 5 Year Bond
  - Coupon received: 600

- 10 Year Bond
  - Bond was sold
  - Statement value at time of sale, including accrued interest: 40,500
  - Market value at time of sale, including accrued interest: 41,500

- Expenses
  - Policy maintenance: 100
  - Investment: 120

5. Continued

Assume:

- Federal Income Tax Rate: 35%
- Federal Capital Gains Tax Rate: 15%
- Pretax Statutory income equals taxable income
- Net cash flow for 2013 is held in cash
- There are no other financial assets, liabilities or transactions that apply

(a) (*7 points*) Prepare each of the following Statutory financial statements for calendar year 2013, ignoring items not relevant to the company:

(i) (*3 points*) Summary of Operations

(ii) (*2 points*) Balance Sheet at the beginning and end of the year

(iii) (*2 points*) Analysis of Increase in Reserves during the year, assuming the tabular cost is 200 for the whole life policy and 0 for the deferred annuity

(b) (*3 points*) Several weeks after filing the Statutory Annual Statement for calendar year 2013, DSL's valuation actuary receives a letter from a consulting actuary who has been hired by DSL's state regulator to review the filing. The letter requests the following items:

- Description of methods and assumptions used to calculate reserves
- Summary of tests performed to validate reserves
- Detailed records of all the company's financial transactions for the past 5 years

The valuation actuary decides to ignore the letter for the following reasons:

- They are busy working with the president of DSL's holding company on an extremely important project, and do not have time to answer questions about an immaterial amount of business.
- They do not believe DSL's Statutory Annual Statement needs to be examined by the state, given that DSL's auditor has signed off on it.
- They have never been given authority by DSL's Board of Directors to respond to regulatory requests.

Based on Actuarial Standard of Practice No. 21, assess the appropriateness of the valuation actuary's actions.

6. (*8 points*) ABC Insurance Co. is an established Canadian individual disability income insurer with operations in Canada and with a new operation in the United States. In the past, ABC has looked at capital from a statutory balance sheet perspective but is now implementing an economic capital framework.

(a) (*2 points*) Describe the advantages and disadvantages of ABC implementing an economic capital framework.

(b) (*6 points*) With respect to ABC's economic capital:

(i) (*1 point*) Define the aspects of the morbidity risk ABC should consider in their economic capital model.

(ii) (*1 point*) List a possible catastrophic event that could impact disability incidence and termination rates.

(iii) (*4 points*) You are given the following correlation matrix and economic capital requirement for the Underwriting & Demographic risks:

Risk	**Mortality**	**Morbidity - Incidence**	**Morbidity - Recovery**	**Lapse**	**Expense**
Mortality	1.00	0.25	0	0	0.25
Morbidity - Incidence	0.25	1.00	-0.75	0	0.75
Morbidity - Recovery	0	-0.75	1.00	-0.50	0.75
Lapse	0	0	-0.50	1.00	0.25
Expense	0.25	0.75	0.75	0.25	1.00
Economic Capital	1	14	27	7	4

Calculate the Economic Capital required for the Underwriting & Demographic risks with and without the diversification benefit. Show all work.

7. (*6 points*) JWL Life has the following liabilities risk profile as of year-end 2012:

Individual Life Products	Face Amount (millions)	Statutory Reserves (millions)
20-year-term (T20)	24	2
10-year-term (T10)	200	9
Whole Life	250	20

(a) (*2 points*) You are given:

- There are no other reduction items applicable to the individual life products
- The RBC C-2 factor is 0.002
- The RBC C-3 factor is 0.01

(i) Calculate the RBC C-2 requirement as of year-end 2012

(ii) Calculate the RBC C-3 requirement as of year-end 2012

Show all work.

(b) (*4 points*) You are given the following reinsurance proposals:

Proposal 1: YRT reinsurance with 50% quota-share arrangement on the Whole Life business

Proposal 2: Coinsurance reinsurance with a 50% quota-share arrangement on the T20 & T10 business

(i) Explain how JWL can transfer the mortality and interest rate risk under each proposal.

(ii) Assume the ceded YRT reinsurance reserve credit for the Whole Life product is estimated by using 20% of the gross statutory reserve. Recommend the proposal that would allow JWL to transfer more mortality and interest rate risk. Justify your answer.

****END OF EXAMINATION****
Morning Session

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