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

Exam ILALFVU

AFTERNOON SESSION

Date: Thursday, November 3, 2016
Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 5 questions numbered 7 through 11 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.

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

7. (*8 points*)

(a) (*1 point*) List the key steps required for a company to implement an effective evaluation process of Internal Control over Financial Reporting (ICFR) according to the COSO framework.

(b) (*4 points*) You are the Chief Actuary of ARA Insurance. ARA offers a variety of life insurance products and conducts experience studies every 10 years. The credibility of the experience is usually low and ARA currently uses its own experience without provision for adverse deviation in the GAAP valuation projection model. The valuation data is managed by third party software which has never been validated.

In anticipation of the meeting with ARA's internal auditors, you have been reviewing ASOPs.

(i) (*2 points*) List any concerns that you think the internal auditors might have. Reference the applicable ASOPs that provide guidance in addressing these concerns.

(ii) (*2 points*) Recommend solutions for each concern.

You have been asked to perform the first round of SOX 404 tests on the controls in your new area.

(c) (*1 point*) Describe the four components of the control evaluation process.

(d) (*1 point*) Describe the impacts of ineffective controls.

(e) (*1 point*) Describe the course of action required when an ineffective control is discovered.

8. (*7 points*) You are given the following information for a variable annuity (VA) product with a guaranteed minimum death benefit (GMDB) rider:

- Valuation date: Dec 31, 2012
- PV of future excess payments calculated at valuation date is 1,100,000
- PV of future assessments calculated at valuation date is 1,000,000
- Assume that the assessments occur at the beginning of the period and the excess payments at the end of the period.
- First year of issue is 2010
- Interest rate is 2.5%
- Past benefits and assessments are given in the table below:

	2010	2011	2012
Excess payments	50,000	30,000	23,000
Assessments	100,000	70,000	40,000

(a) (*3 points*) Calculate the GMDB additional liability under SOP 03-1 as of the valuation date. Show all work.

(b) (*2 points*) The benefit ratio has decreased since issue, even though a recent experience study showed actual mortality rates have been higher than the assumed rates.

Explain two conditions that may have caused the decrease.

(c) (*2 points*) In addition to the GMDB rider, guaranteed minimum income benefit (GMIB), guaranteed minimum accumulation benefit (GMAB), and guaranteed minimum withdrawal benefit (GMWB) riders are being considered.

Explain which GAAP accounting standard will be used to value each optional benefit. Justify your response.

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9. (*8 points*)

(a) (*3 points*) With respect to the following four factors in the stochastic approach to modeling mortality:

A. Underwriting error

B. Volatility

C. Catastrophe

D. Trend

Assess the importance of each of these factors when modeling the mortality risk of:

(i) a term life block

(ii) a payout annuity block

(b) (*3 points*) You are given the following for a term life block:

- Total face amount inforce: 4 billion
- Total net amount at risk: 3 billion
- Total reserve: 1 billion
- Based on the current mortality assumption, your financial projections over the next 12 months generate the following results:
    - Expected pre-tax profit: 2.5 million
    - Expected pre-tax return on equity (ROE): 10%
- Based on a stochastic analysis of pandemic risk, the distribution of additional death claims over the next 12 months is:
    - 99^{th} percentile: 12.5 million
    - Assume all pandemic death claims have a net amount at risk consistent with the average of the inforce block.
    - Assume shareholder equity remains constant during a pandemic at the 99^{th} percentile risk profile.

Determine the pre-tax ROE for the 99^{th} percentile pandemic risk scenario. Show all work.

9. **Continued**

(c) (*2 points*) You are given the following alternatives for managing future mortality experience:

A: A yearly renewable term treaty where the reinsurer pays claims in excess of a set retention limit per life insured.

B: A multi-year stop loss treaty where the reinsurer pays claims in excess of an attachment point limit set in the treaty.

Describe how each alternative impacts the mortality risk profile.

10. (*8 points*)

(a) (*4 points*) The following statements have been made regarding the changes IFRS 4 Phase II will have on reserves and net income recognition:

A. Changes in the present value of expected cash flows related to future service should be recognized in earnings when the change becomes known.

B. Insurance contract revenue and expense should be presented in the statement of comprehensive income with revenue recognized as earned including investment components.

C. An entity should choose to present the effect of changes in discount rates in profit and loss or in Other Comprehensive Income (OCI) as its accounting policy. The same accounting policy should be applied to all similar insurance contracts that are backed with similar investments.

D. A contract which is deemed to be onerous at time of issuance will be deemed to be onerous throughout the term of the contract.

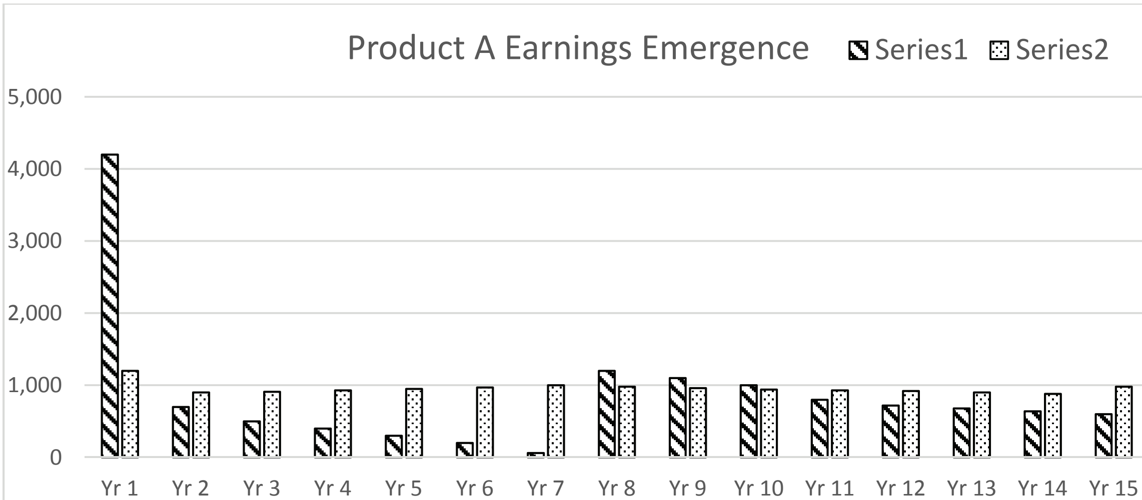
Critique each of the above statements and recommend changes where appropriate.

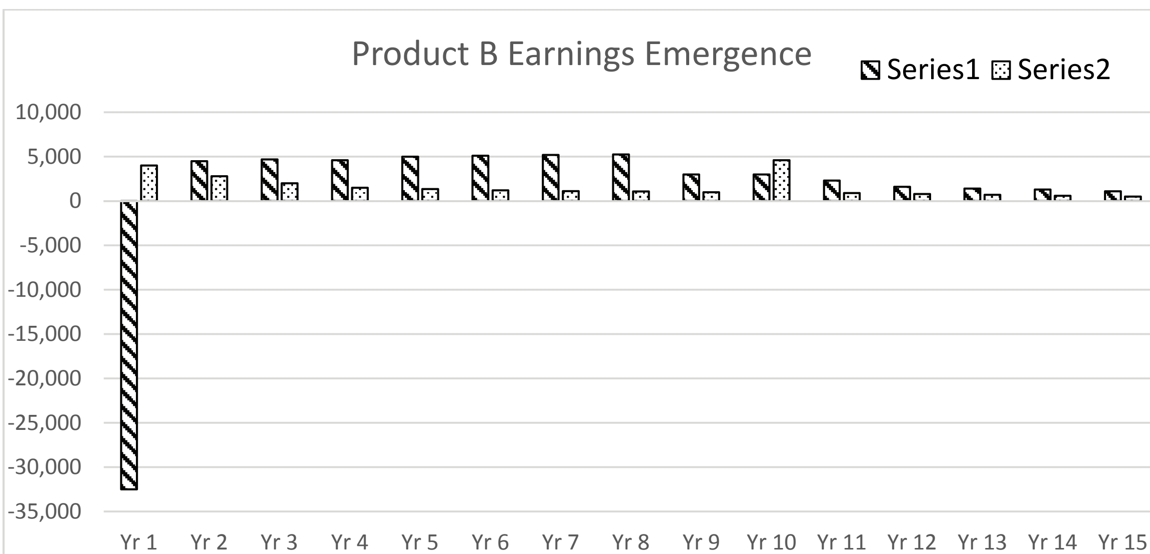
(b) (*4 points*) The valuation actuary produced the following graphs of the earnings emergence using both U.S. Statutory and IFRS for the following two products that are both priced to generate the same return on investment (ROI):

- A 10-year term life insurance product with annual renewable term premiums in the post-level term period which also includes shock lapses of 85% in Year 10 and 40% in Year 11.
- A deferred annuity product that includes a surrender charge for the first six years, a surrender assumption of 5% per annum during the surrender charge period followed by high surrenders of 20% when the surrender charge expires with an ultimate surrender rate of 10% thereafter.

10. Continued

Each graph shows earnings emergence under U.S. Statutory and IFRS for a given product.





Question 10 continued on next page.

10. **Continued**

Identify which product graph and earnings emergence bar series corresponds to each of the following:

(i) 10-year term life under IFRS

(ii) 10-year term life under U.S. Statutory

(iii) Deferred annuity under IFRS

(iv) Deferred annuity under U.S. Statutory

Justify your answers.

11. (*9 points*) With respect to the NAIC Own Risk and Solvency Assessment (ORSA):

(a) (*1 point*) Describe the two primary goals of ORSA.

(b) (*2 points*) Describe the major areas that should be discussed in Section 1 of the ORSA Summary Report.

(c) (*4 points*) Assess the validity of each of the following statements and correct any incorrect statements:

A. The manner and depth in which the insurer addresses the key risk principles is dependent upon its own risk-management processes.

B. In the U.S., a specific risk assessment technique is prescribed for each risk category.

C. The goal of the group capital assessment is to calculate the minimum amount of capital before regulatory action will result.

D. The ORSA Summary Report should be the medium of reporting enterprise risk management (ERM) to the Board of Directors.

E. The Commissioner may provide assumptions and scenarios to be used in the assessment.

F. All insurers are required to file an ORSA Summary Report at least annually.

G. The ORSA Summary Report should acknowledge that model validation was performed, but does not need to provide any further details regarding the validation.

H. For assumptions that are stochastically modeled, the insurer does not need to set expected values based on current anticipated experience.

(d) (*2 points*) Describe how ORSA is incorporated into a company's business planning process.

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

USE THIS PAGE FOR YOUR SCRATCH WORK