

---

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

**Exam ILALFVU**

**AFTERNOON SESSION**

**Date:** Thursday, October 30, 2014

**Time:** 1:30 p.m. – 3:45 p.m.

---

**INSTRUCTIONS TO CANDIDATES**

**General Instructions**

1. This afternoon session consists of 4 questions numbered 8 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.





**\*\*BEGINNING OF EXAMINATION\*\***

**Afternoon Session  
Beginning with Question 8**

- 8.** (10 points) Company XYZ has a block of universal life policies issued in the same year. The COI charges are level throughout the life of the policy.

You are given the following information:

|                                  | 12/31/2012 | 2013   | 2013      |
|----------------------------------|------------|--------|-----------|
|                                  | Actual     | Actual | Projected |
| Premiums                         |            | 1,000  | 900       |
| Net Investment Income            |            | 200    | 210       |
| Cost of Insurance                |            | 45     | 50        |
| Death Benefits Paid              |            | 250    | 300       |
| AV Release on Death              |            | 225    | 260       |
| Surrender Charge                 |            | 100    | 80        |
| Maintenance Expense              |            | 25     | 20        |
| Interest Credited                |            | 110    | 100       |
| Account Value (AV)               | 25,000     |        |           |
| SOP Reserve                      | 165        |        |           |
| DAC                              | 200        |        |           |
| PV <sub>0</sub> (SOP Assessment) | 2200       |        |           |
| PV <sub>0</sub> (SOP Excess DB)  | 700        |        |           |
| PV <sub>0</sub> (future EGP)     | 570        |        |           |
| Expected Credited Rate           | 4%         |        |           |

- All cashflows occur at the end of the year.
- (a) (3 points) Calculate the expected SOP 03-1 reserve at 12/31/2013 based on model projected results for 2013. Show all work.
- (b) (3 points) Assume the actual 2013 cashflows occur 7 years after issue with no prospective unlocking. Calculate the actual SOP03-1 reserve at 12/31/2013 based on actual 2013 cashflows. Show all work.
- (c) (1 point) Calculate the estimated gross profits in 2013 based on projected cashflows. Show all work.

**8. Continued**

(d) (3 points)

- (i) Outline the purpose for the shadow adjustment on the DAC.
- (ii) Calculate the DAC at 12/31/2013 using projected cashflows assuming unrealized capital gain of 100.
- (iii) Explain how the DAC estimated above may differ from actual reported DAC.

9. (10 points) You are given the following for a 10-Year Single Premium Deferred Annuity contract subject to SFAS 91:

|                               |                       |
|-------------------------------|-----------------------|
| Premium                       | 100,000               |
| Deferrable Acquisition Costs  | 6,000                 |
| Maintenance Expense in Year 1 | 25                    |
| Surrender Rate in Year 1      | 10%                   |
| Surrender Charge in Year 1    | 4% of Account Balance |
| Crediting Rate in Year 1      | 6.5%                  |
| Break-even interest rate      | 7.3904%               |

- Maintenance expenses, surrenders and interest crediting occur at the end of the year.
  - There are no differences between experience expected at issue and actual experience.
- (a) (3 points) Determine the DAC Balance at the end of Year 1.
- (b) (7 points) Prepare the GAAP balance sheet as of the end of Year 1 using the minimum investment rate such that the contract will not realize a loss in Year 1.

Show all work.

**10.** (10 points) You are an actuary working in the valuation area of Bridge Life, a U.S. company, whose role is to calculate statutory and tax reserves.

- (a) (3 points) Before calculating reserves, you ask an actuarial student to help analyze reserving rules.
- (i) (1 point) State three criteria for a transaction to be allowed for tax purposes.
- (ii) (2 points) The actuarial student has made the following statement:

*“The tax reserve may be higher than the stat reserve; however, we must be careful that the reserve calculation method we choose does not maximize tax benefits.”*

Critique this statement.

- (b) (7 points) Bridge Life issues a five-year non-life contingent single premium annuity. You are given the following data:

|  |   |
|--|---|
| Single Premium                         | 100,000   |
| Surrender charge                       | 5% through the end of the 5th policy year           |
| Applicable Federal Rate                | 2.50%   |
| Prevailing State Assumed Interest Rate | 3.50%   |
| Guaranteed Credited Interest Rate      | 5.00% in first year followed by 2% in renewal years |

- No withdrawals are allowed during the first policy year
- No free partial withdrawals
- No settlement options other than cash surrender

Calculate the difference between the tax reserve and the stat reserve at issue. Show all work.

**11.** (10 points) You are an actuary working for Glacier Life & Annuity, a U.S. company. Glacier is beginning its annual planning process. As part of this process, the company is reviewing prior earnings.

- (a) (2 points) Describe three ways a company can manage its earnings.
- (b) (4 points) Glacier's income statement for the prior two years is as follows:

|                    | 12/31/12 | 12/31/13 |
|--------------------|----------|----------|
| Premium            | 50,200   | 52,140   |
| Interest           | 3,450    | 3,500    |
| Death Claims       | 7,300    | 8,150    |
| Surrenders         | 4,500    | 4,250    |
| Change in Reserves | 19,400   | 20,000   |
| Expenses           | 9,500    | 12,420   |
| Earnings           | 12,950   | 10,820   |

Senior management is very concerned about the decrease in earnings. The Chief Actuary has stated, “A significant increase in death claims and expenses is clearly driving the earnings decrease. We should focus our attention on improving these two items.”

You have been asked to do a “gains by source” analysis to further investigate the earnings decrease. You are provided with the following additional data:

|                     | 12/31/12 | 12/31/13 |
|---------------------|----------|----------|
| Net Premium         | 36,750   | 41,430   |
| Expected Interest   | 3,400    | 3,450    |
| Expected Surrenders | 4,500    | 4,300    |
| Expected Expenses   | 9,000    | 12,500   |
| Expected Death Rate | 0.02     | 0.02     |
| Actual Death Rate   | 0.03     | 0.03     |
| Death Benefit       | 75,000   | 97,000   |
| Reserve             | 70,000   | 90,000   |

Critique the appropriateness of the Chief Actuary's statement.

- (c) (4 points) Glacier is developing its strategic plan for the next 5 years. You have been asked to assist in the allocation of capital to the company's profit centers.



## 11. Continued

You are given the following results from the first draft of the financial plan:

| Profit Center | GAAP ROE | Equity Growth Rate | Change in Equity |
|---------------|----------|--------------------|------------------|
| A             | 7%       | 10%                | 340              |
| B             | 18%      | 9%                 | 210              |
| C             | 14%      | 16%                | 190              |
| Total Company | 10%      | 11%                | 740              |

Company Cost of Capital: 10%  
Shareholder Dividend: 2%

Analyze the above results and recommend changes to the allocation of capital in order to create economic value.

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

**USE THIS PAGE FOR YOUR SCRATCH WORK**