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.
7. (13 points) You are given the following cash flow summary data:

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>BOP PV of Deferrable Expenses</th>
<th>BOP PV of Future Gross Profits</th>
<th>Unrealized Capital Gains/(Losses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>10,000</td>
<td>14,255.06</td>
<td>500</td>
</tr>
<tr>
<td>2016</td>
<td>0</td>
<td>12,826.49</td>
<td>(200)</td>
</tr>
<tr>
<td>2017</td>
<td>0</td>
<td>11,533.97</td>
<td>250</td>
</tr>
<tr>
<td>2018</td>
<td>0</td>
<td>10,364.55</td>
<td>1,000</td>
</tr>
<tr>
<td>2019</td>
<td>0</td>
<td>9,306.51</td>
<td>0</td>
</tr>
</tbody>
</table>

(a) (2 points) Calculate the Primary DAC Asset at December 31, 2018. Show all work.

You are given:

- Constant crediting rate = 5%
- Federal Income Tax Rate = 21%
- The unrealized capital gain in 2018 was primarily driven by yield curve changes

(b) (7 points)

(i) (4 points) Calculate the Shadow DAC Asset Adjustment at December 31, 2018 assuming an annual 10% reduction in expected gross profits in years 2019 and later. Show all work.

(ii) (2 points) Derive the debit/credit entries to record the Shadow DAC impact on Shareholder’s Equity in 2018.

(iii) (1 point) Explain the rationale for the 10% reduction in projected gross profits mentioned in part (i).
7. Continued

(c) (4 points)

(i) Calculate the Shadow DAC Asset Adjustment at December 31, 2018 using the common approximation approach. Show all work.

(ii) Assess the validity of the common approximation approach and suggest when its use would and would not be appropriate.

(iii) Explain why Shadow DAC is irrelevant under FASB’s proposed targeted improvements for long-duration contracts.
8. (12 points) You are the valuation actuary at DLF Life Insurance Company, a large US-based company that focuses on selling the following three products:

- 10 Year Term insurance with the following features
  - Conversion option
  - Automated underwriting only
- Variable Universal Life with the following features
  - Policy loans allowed after policy year 5
  - 20 year no-lapse guarantee
- Universal Life with the following features
  - A lifetime no-lapse guarantee

DLF has adopted Principle-Based Reserves (PBR) for all of their products. A response letter requesting clarification on assumptions used for the Stochastic and Deterministic Reserves from their domiciliary commissioner was received on 3/31/2018 with a requested response date of 4/30/2018. The Appointed Actuary at DLF has asked that you prepare a response. Below is a draft of the letter:

April 15, 2018
Dear Insurance Commissioner of Minnesota,
Below are responses to the questions in your letter dated March 31, 2018 with respect to DLF Life Insurance Company’s PBR modeling:

- With respect to the questions on the 10 Year Term Stochastic and Deterministic Reserve surrender and mortality assumptions:
  - The surrender rate assumption relied on an external source for the data that provided general surrender rates that varied by issue age and duration
  - The mortality assumption used company-wide experience to gain better credibility

- With respect to the questions on the Variable Universal Life Stochastic and Deterministic Reserve assumptions:
  - Surrender rates were calculated using only historical company data, and unchanged for all scenarios
  - Surrender rates were lowered in durations 5+ to account for the embedded option of policy loans that could affect policyholder behavior
  - Premium payment assumption is level in all years equal to the first year payment amount
  - Expense inflation is linked to the 1 year treasury rate

- With respect to the questions on the Universal Life Stochastic and Deterministic Reserve projection assumptions:
  - The mortality assumption includes projected mortality improvement for only 5 years in calculating reserves
  - The surrender assumption is decreased from the base assumption when the cash value of the policy is greater than zero
  - The premium payment pattern assumption for all future years is the amount paid in the last contract year

Sincerely,
Valuation Actuary
DLF Life Insurance Company
8. Continued

(a) \(4 \text{ points}\) Critique the response with respect to each of the requirements for actuarial communications in Actuarial Standard of Practice 41.

(b) \(5 \text{ points}\) Critique the response with respect to the requirements for PBR for life products under the NAIC Valuation Manual.

You have started to incorporate PBR in some of the items for the NAIC Annual Statement.

(c) \(3 \text{ points}\)

(i) Describe how each of the following exhibits in the NAIC Annual Statement for life and annuity products would be affected by the values generated in the PBR calculation.

- Analysis of Increase in Reserves During the Year
- Exhibit 1 – Part 1 – Premiums and Annuity Considerations For Life and Accident and Health Contracts
- Exhibit 5 – Aggregate Reserve For Life Contracts
- Exhibit 8 – Claims for Life and Accident and Health Contracts
- Exhibit of Life Insurance
- Exhibit of Number of Policies

(ii) Explain whether the PBR would affect the Summary of Operations.
9. (8 points) You are given the following information for a cohort of universal life policies:

<table>
<thead>
<tr>
<th>Account Value (AV) Rollforward</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOY Balance</td>
<td>1,500</td>
</tr>
<tr>
<td>Premium</td>
<td>200</td>
</tr>
<tr>
<td>Interest credited to AV</td>
<td>45</td>
</tr>
<tr>
<td>Cost of Insurance charges</td>
<td>100</td>
</tr>
<tr>
<td>Expense charges</td>
<td>50</td>
</tr>
<tr>
<td>AV released on deaths</td>
<td>10</td>
</tr>
<tr>
<td>AV released on surrenders</td>
<td>15</td>
</tr>
<tr>
<td>EOY Balance</td>
<td>1,570</td>
</tr>
</tbody>
</table>

| BOY DAC (as of 1/1/2017)       | 200 |
| BOY URL (as of 1/1/2017)       | 100 |
| Invested assets               | 2,000|
| DAC k-factor                  | 42%  |
| URL k-factor                  | 19%  |
| Earned rate on investments    | 5.0% |
| Crediting rate                | 3.0% |

For calendar year 2017

<table>
<thead>
<tr>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death benefits</td>
</tr>
<tr>
<td>Surrender benefits</td>
</tr>
<tr>
<td>Direct maintenance expenses</td>
</tr>
<tr>
<td>Overhead expenses</td>
</tr>
<tr>
<td>Commissions</td>
</tr>
<tr>
<td>Increase in statutory reserves</td>
</tr>
</tbody>
</table>

Assume:

- DAC and URL are amortized over estimated gross profit (EGP) at EOY.
- Premiums and commissions are paid annually at the end of the year.
- Commissions are fully deferrable.
- Actual results were consistent with the expected results in 2017.
- No taxes

(a) (3 points) Prepare the Summary of Operations for calendar year 2017.

(b) (5 points)

(i) Calculate the net GAAP liability at EOY (as of 12/31/2017). Show all work.

(ii) Create the 2017 GAAP income statement.
10. (7 points) ORD Life is pricing a new universal life product and is concerned with significant negative gross profits. You are given the following values from the pricing team:

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated Gross Profits (EGPs)</th>
<th>Deferrable Acquisition Costs</th>
<th>Balance of Insurance in force</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>250</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>400</td>
<td>10</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>-100</td>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>200</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>-500</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Assume:
- Credited rate is 5.0%
- Deferrable acquisition costs occur at the beginning of the year
- EGPs and the insurance in force are as of the end of the year
- Long-duration insurance contract subject to SFAS 97
- All values were reasonably estimated

(a) (2 points) Describe considerations in determining an appropriate DAC amortization basis for this product.

(b) (1 point) Assess whether the information provided is sufficient to determine the necessity of establishing an SOP 03-1 liability.

(c) (4 points) ORD Life is reviewing the impact of the accounting changes from the FASB’s proposed targeted improvements for long-duration contracts.

Calculate the DAC balance at the end of year 2 under the accounting standards proposed in 2016. Show all work.

**END OF EXAMINATION**

Afternoon Session
USE THIS PAGE FOR YOUR SCRATCH WORK