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

**Exam ILALFVU**

**MORNING SESSION**

**Date:** Thursday, October 29, 2015

**Time:** 8:30 a.m. – 11:45 a.m.

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**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.





**\*\*BEGINNING OF EXAMINATION\*\***  
**Morning Session**

- 1.** (8 points) You have been asked to perform an actuarial review of a U.S. life insurance company's term life and universal life (UL) statutory reserves.
- (a) (2 points) List six general principles to follow in performing a satisfactory audit of reserves.
- (b) (3 points) You are given the following for the company's term life block:

In Millions	2012	2013	2014
Beginning face amount in force	30,000	31,500	33,075
Ending face amount in force	31,500	33,075	33,900
Beginning reserve	1,412	1,483	1,556
Valuation net premium	654	687	704
Tabular interest	60	63	65
Reserves released by death and other terminations	91	94	100
Ending reserve	1,483	1,556	1,594

Evaluate the reasonableness of the reserves by analyzing the trend in the average tabular mortality rate. Justify your answer. Show all work.

# 1. Continued

(c) (3 points) You are given the following for the company's UL block:

In Millions	2012	2013	2014
Beginning account value	75	174	260
Deposits net of front end loads	125	113	101
Cost of insurance charges	10	9	8
Expense charges	1	1	1
Account value released by death and other terminations	19	28	36
Ending account value	174	260	328

Assume:

- Reserve is the account value
- Deposits net of front end loads, cost of insurance charges, expense charges and account value released by death and other terminations have been separately audited and found to be accurate
- Credited interest rates during 2012-2014 varied between 3.5% and 4.5%
- There are no other charges or credits

Evaluate the reasonableness of the reserves using the roll forward approach. Justify your answer. Show all work.

2. (10 points) You are an actuary responsible for the GAAP reporting of LHW Life, a U.S. insurance company with a Canadian subsidiary.

(a) (3 points) You are given:

Security	Fair Value November Month-End	Fair Value December Month-End	Category
ZZ	30	35	Available for Sale
YY	50	40	Held to Maturity
XX	100	120	Trading
WW	120	90	Trading

Calculate the total impact on LHW's GAAP financials for December month-end. Show all work.

(b) (4 points) You are given the following information for a group of securities that LHW currently holds at amortized cost:

Security	Fair Value	Amortized Cost	
UU	100	150	LHW recently sold five similar securities at a loss
TT	120	110	LHW plans to hold to maturity
SS	80	100	LHW plans to hold for at least 10 years
RR	60	90	LHW recently sold a similar security at a loss, but plans to hold this security to maturity

For each security, state the additional information you would consider in order to determine its impairment status.

## 2. Continued

- (c) (3 points) LHW uses hedging to reduce some of its financial risks. You are given the following information on LHW's hedges:

Hedge classification	Change in value – effective portion	Change in value – ineffective portion
Fair value	20	10
Cash flow (item being hedged has not yet impacted earnings)	7	-12
Foreign currency (hedge on change in fair value in LHW's Canadian operation)	15	-6
Foreign currency (hedge on net investment in LHW's Canadian operation)	5	-5

Determine the total impact on LHW's GAAP financials. Show your work.

3. (8 points) ABC Life is a U.S. stock company that is considered a small life insurance company under tax law.

(a) (5 points) You are given:

In Millions	2013	2014
<b>Revenue</b>		
Earned premium from individual life		15.000
Annuity considerations		5.000
Change in premium received in advance		2.000
Change in deferred and uncollected premiums		3.000
Net investment income		4.000
<b>Expense</b>		
Maintenance expense		1.500
Commissions		0.525
Benefits paid		5.000
Policyholder dividends		1.050
<b>Liabilities</b>		
Statutory reserves	79.000	85.000
Tax reserves	74.000	79.000

ABC Life received dividends of 0.5 million from its common stock portfolio in 2014 which is included in its net investment income. ABC Life can deduct 70% of these dividends for tax purposes. All of its remaining net investment income is fully taxable.

A total of 5 million was capitalized for DAC Tax in 2012 and 2013, leaving 4 million unamortized at the end of 2013.

Capitalization rates:

- 1.75% for Annuity
- 2.05% for Group Life
- 7.7% for all other lines

Calculate ABC's tentative Life Insurance Company Taxable Income (LICTI) for 2014 before small company deduction. Show all work.



### 3. Continued

(b) (3 points) You are given:

Year	Tentative LICTI (in millions)
2015	3
2016	3
2017	15
2018	4

- (i) Recalculate LICTI after carryback for each prior year, assuming an operational loss of 15 million for 2019. Show all work.
- (ii) Describe situations, in general, when a company would carry an operating loss deduction forward.

**4.** (10 points)

(a) (4 points) With regard to the top-down and bottom-up approaches of calculating the discount rate as referenced in *Practical Guide to IFRS*:

(i) (1 point) You are given:

Expected reference portfolio rate	6.00%
Duration mismatches	0.50%
Liquidity premium	1.25%
Market risk premium for expected credit losses	1.50%
Market risk premium for unexpected credit losses	1.00%
Risk-free rate of return	2.50%

Determine the discount rates that would be used to value liabilities using each of the two approaches. Show all work.

(ii) (3 points) Describe the rationale for the inclusion of each component under each approach.

(b) (6 points) Critique each of the following statements about fair value accounting:

A. *Fair value accounting was the primary cause of the financial crisis of 2008.*

B. *Fair value accounting unfairly forces a company that is in financial turmoil to sell its assets at distressed prices that do not reflect anticipated cash flows.*

C. *Fair values for intricate financial derivatives (level 3) cannot be reliably produced even with complex computer models.*

D. *Fair value accounting increases volatility.*

E. *Fair value accounting provides a true view of long-term value. Financial items valued under mark-to-market rules do not distort a company's balance sheet.*

F. *Fair value accounting requires swift asset write-downs that help to re-establish stability after a financial crisis.*

Justify your response.

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5. (7 points) You are given the following for a Whole Life policy from DEF Life issued in 2014:

Face Amount	1,000,000
Premium Rate per 1000	8
Commission Rate (% premium)	10% in all years
Maintenance Expenses	100 per policy
Reserve at December 31, 2014	8,000
Reserve at December 31, 2015	9,500

DEF Life enters a modified coinsurance reinsurance arrangement with XYZ Re starting January 1, 2014.

You are given:

Quota Share	40%
Expense Allowance	20% of reinsurance premium
XYZ Re's Maintenance Expenses	50 per cession
Net Investment Income Rate (for both companies)	5% per annum
DEF Life's Surplus at December 31, 2014	1,000
XYZ Re's Surplus at December 31, 2014	2,000
Mod-co interest rate	5% per annum

Assume:

- Policy and reinsurance premiums are paid annually in advance
- Policy fees, claims, surrenders and taxes are 0 in all years
- Expenses are incurred on policy anniversaries
- Investment Income is earned on beginning of year assets only

Construct the income statements and balance sheets for DEF Life and XYZ Re for this policy at the end of calendar year 2015. Show all work.

6. (11 points) Euro Life (EL) is a European-based company subject to Solvency II requirements. EL is considering the purchase of YNK Life, a U.S. company.

(a) (4 points) EL plans to develop an economic capital model for YNK.

Identify the approach in developing the economic capital model and the resulting outcome if EL's only concern is:

- (i) U.S. statutory reporting
- (ii) Solvency II
- (iii) Embedded value (EV)

(b) (5 points) You are given the following Risk Based Capital (RBC) data for YNK:

Asset risk other	100 Million
Asset risk common stock	20 Million
Interest risk	50 Million
Insurance risk	100 Million
All other risks	0 Million
Class 4 bonds	50 issuers
Bond Class 3 factor	0.046
Bond Class 4 factor	0.10
First 50 issuers factor	2.5
Next 50 issuers factor	1.3
RBC ratio	175%

Describe the U.S. regulatory consequences of:

- (i) (1 point) YNK's current capital position.
- (ii) (4 points) YNK's resulting capital position if they sell the current bond portfolio for statement value and reinvest the proceeds in 100 issuers of Class 3 bonds.

Show all work.

(c) (2 points) Senior management is concerned about having a "level playing field" under future U.S. solvency frameworks if they purchase YNK.

Describe current solvency framework initiatives in the U.S. that would impact EL's decision.

7. (6 points) Supra Reinsurance has an automatic YRT agreement with Vega Insurance Company on its whole life product. Both Supra and Vega are domiciled in the U.S.

The automatic reinsurance agreement is a 50% quota-share agreement in excess of the ceding company's retention limit of 100,000. The auto binding limit is 1,000,000.

In addition, the Waiver of Premium (WP) rider attached to the policy is coinsured under a separate reinsurance agreement with Supra at a 75% quota share, with allowances of 80% in the first policy year and 10% in renewal policy years.

Vega issued a 500,000 whole life policy to a 45 year-old non-smoker male with annual premiums of 5,300. This policyholder selected a level face amount, and purchased the WP rider for an additional 50 per year.

The reinsurance YRT rates for a 45 year-old male non-smoker are 45% of mortality table M.

You are given:

Duration	Cash Value Per 1000
10	47
20	143
30	351
40	598
50	847

Mortality table M ( $q_x$  per 1000):

Issue age	Duration		
	1	2	3
45	0.42	0.59	0.74
46	0.46	0.62	0.76
47	0.50	0.64	0.80

Premium tax is 5%.

**7. Continued**

- (a) (3 points) Calculate the net amount payable in the second policy year by Vega to Supra for this policy under these reinsurance agreements. Show all work.
- (b) (3 points) Supra is not licensed in Vega's state of domicile. Recommend a solution that would allow Vega to claim a reserve credit on its statutory statement.

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

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