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

Exam ILALFVU

MORNING SESSION

Date: Friday, May 2, 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.

BEGINNING OF EXAMINATION
Morning Session

1. (*7 points*) You are given the following company risk profiles:

	Economic Basis	**Statutory Basis**
Asset Risk	380	180
Insurance Risk	2,500	1,800
Interest Risk	1,500	900
Business Risk	300	-
Simple Sum	**4,680**	**2,880**
Diversification Benefit	-1,638	?
Diversified Sum	**3,042**	**?**

Assume:

- The Statutory Basis is US RBC
- C_0 = 100 and C_{1a} = 80 under asset risk
- C_{3a} is all interest rate risk

(a) (*3 points*) Calculate the Authorized Control Level Risk-Based Capital under the statutory basis.

(b) (*4 points*)

(i) (*1 point*) Identify which basis produced a higher diversification.

(ii) (*3 points*) Describe three factors which might drive the basis you identified above to produce higher diversification benefits.

Show your work.

2. (*8 points*)

(a) (*6 points*) Blue Jay Insurance is a life insurer that has reinsured their Term 10 life insurance product on an excess YRT basis with Rock Reinsurance. The reinsurance treaty's effective date is 1 January 1995. You are given the following information on the treaty:

- Blue Jay Insurance retains the first 100,000 of face amount per life.
- Rock Reinsurance reinsures face amount in excess of 100,000 per life.
- Blue Jay Insurance may elect to increase new business retention limits with written notice to Rock Reinsurance.
- The treaty contains a recapture provision as follows: "If Blue Jay Insurance increases their per life retention limit on new business, Blue Jay Insurance may also recapture up to the new retention limit on inforce lives. Individual policies cannot be recaptured prior to their 10^{th} policy anniversary."
- The following recapture fee schedule applies:

Policy Year	Recapture Fee per 1000 Face Amount Recaptured
1-10	Not applicable
11	40
12	30
13	25
14	18
15+	13

Blue Jay Insurance is considering increasing their new business retention limit from 100,000 to 150,000 face amount per life. They are also considering increasing retention on inforce business in accordance with the reinsurance treaty terms. You are given:

	Total Inforce Face Amount (Millions)	
Policy Year	Retained with Recapture	Retained without Recapture
1-10	119.5	98.5
11	16.5	13.5
12	15.0	12.5
13	13.5	11.0
14	11.0	9.0
15+	73.5	60.5

2. Continued

The embedded value (EV) calculation assumes the recapture premium has already been paid for policies that have been inforce for at least 10 years. All other inforce policies will be recaptured up to the new retention limit at the earliest possible date and recapture fees will be paid at that time.

	Embedded Value (Millions)	
Term 10 Block of Business	Retained with 150,000 Limit per Life	Retained with 100,000 Limit per Life
Inforce Business	6.2	5.1
Prospective New Business	1.2	1.4
Total	7.6	5.9

Recommend whether Blue Jay should proceed with the proposed retention limit increase for new business only or on both new business and inforce. Justify your recommendation.

(b) (*2 points*) Rock Reinsurance is drafting a new treaty with another client, Argo Life. Argo has requested that a recapture clause be included and have asked for a structure that does not include recapture fees.

(i) Propose recapture clause conditions that Rock Reinsurance could include to limit the risks associated with Argo's recapture of their business.

(ii) Rock Reinsurance has indicated to Argo that allowing recapture will require higher YRT reinsurance premium rates. Argo's pricing actuary commented:

"*Charging higher YRT premiums so that we can recapture at a later date doesn't make sense because recapturing just moves the risk from Rock to us. There is no change to the reserves or the policy values. I would like the YRT reinsurance premiums to be restored to the pre-capture clause levels.*"

Critique the pricing actuary's comments from Rock Reinsurance's point of view.

3. (*10 points*)

(a) (*4 points*)

(i) (*2 points*) Describe the three components of an IFRS insurance contract liability.

(ii) (*1 point*) You are given the following for a whole life portfolio:

Acquisition Costs (successful efforts)	150
Acquisition Costs (unsuccessful efforts)	200
Expected Present Value of Premiums	5,500
Expected Present Value of Claims	5,000
Assumed Value of Indifferent Fixed Cash Flows (excluding Acquisition Costs)	600

Calculate the components described in (i). Show all work.

(iii) (*1 point*) Describe how these components are treated differently under FASB.

(b) (*3 points*)

(i) (*1 point*) Compare the two approaches to determine the discount rate under IFRS.

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

Risk free rate of return	2.00%
Actual reference portfolio rate	5.50%
Expected reference portfolio rate with asset duration exactly matching liability duration	5.90%
Liquidity premium	1.50%
Market risk premium for expected credit losses	1.20%
Market risk premium for unexpected credit losses	0.70%

Calculate the IFRS discount rate based on each of the two approaches. Show your work.

3. Continued

(c) (*3 points*) For contracts that require the mirroring approach under IFRS:

(i) (*1 point*) Describe the criteria that would qualify contracts for this approach.

(ii) (*2 points*) Explain the measurement and decomposition of cash flows that is required.

4. (*10 points*) Ford Accounting LLP has been hired by Burch Life Insurance Company to perform annual reviews of their year-end financial statements. Tom, senior accountant at Ford, has been assigned to lead the review for year-end 2013. Ben, senior actuary at Ford, has been assigned to assist Tom with the review.

(a) (*3 points*) Burch is a large public company subject to the financial reporting requirements of Section 404 of the Sarbanes-Oxley Act (SOX 404). Burch uses the COSO framework to comply with those requirements.

(i) Describe Burch's management responsibilities under SOX 404.

(ii) Describe the key steps to implementing an effective financial reporting evaluation process within the COSO framework.

(b) (*2 points*) While planning for the review, Ben provides the following advice:

- Tom should reference the review from the prior fiscal year.
- Since Burch is a large company, Tom should reach out directly to individuals from different departments to obtain information needed.
- During the course of the review, Tom should make sure that all material issues are documented and resolved, but he does not need to concern himself with immaterial issues.

Critique Ben's advice.

(c) (*5 points*) Burch's term life block can be subdivided into three major plan groups. The table below shows statistical characteristics of each group:

Plan Group	Number of policies	Face Amount (000's)	
		Mean	Standard Deviation
A	10,000	80	20
B	15,000	175	37
C	25,000	96	24

4. Continued

One of the tests Ford will perform requires a random sample of 100 policies where the sample mean of the face amounts will be used to estimate the mean face amount of the entire block. Tom plans to take a simple random sample, but Ben suggests that the accuracy of the estimate can be improved if the random sample is stratified as follows:

Plan Group	Policies chosen
A	20
B	30
C	50
Total	100

(i) (*1 point*) Compare and contrast simple random sampling with stratified random sampling.

(ii) (*4 points*) Determine whether or not you agree with Ben's suggestion by calculating and comparing the standard deviation of the sample mean under both approaches. Show all work.

5. (*10 points*) Gibraltar is a U.S. subsidiary of a European life insurance company and is required to prepare financial statements in accordance with IFRS and U.S. GAAP. As a subsidiary of a European parent, Gibraltar is also impacted by significant aspects of Solvency II capital requirements.

(a) (*2 points*) On June 20, 2013, the IASB published a revised exposure draft of IFRS standards for insurance contracts. For each of the following items, compare the treatment under the revised exposure draft with the treatment under Solvency II:

- Deferral of acquisition costs
- Determination of the discount rate
- Use of a contractual service margin

(b) (*3 points*) Gibraltar sells variable annuity products containing embedded derivatives subject to FAS 133. Describe the hedgeable risks of these products and the different types of hedges available to mitigate these risks.

(c) (*5 points*) You are given the following information for an in-force variable payout annuity:

- No deferred acquisition costs are held for this policy
- Annual annuity payments are at the end of the year
- Assumed interest rate is 5%
- Net appreciation rate is 6%
- Mortality and expense charges are 1% of the policyholder balance at the beginning of the year.

- As of December 31, 2013:
  Policyholder balance = 50,000
  Unit value = 12.0
  Annuity payment = 8,400

- In 2014:
  Expenses = 21
  Mortality assessment = 6,500
  Mortality rate = 0.05

5. Continued

Under U.S. GAAP:

(i) (*2 points*) Calculate the expected gross profit for 2014. Show your work.

(ii) (*3 points*) As of December 31, 2014, assume the unit value is 13.2 and the policy is still inforce. Calculate the mortality gain or loss for 2014. Show your work.

6. (*10 points*) You are a valuation actuary at KVV Life which sells traditional life insurance and accident & health (A&H) insurance products.

You are given:

As of 31 Dec 2013 (Millions)					
Life			A&H		
Reserve	Stat	Tax	Reserve	Stat	Tax
Policy Reserve - Basic	800	750	Active Life Reserve – NC/GR	500	502
Deficiency Reserve	15	0	Active Life Reserve - Cancellable	700	680
Cash Surrender Value	750	750	PVANYD – NC/GR	40	40
SCNILC	30	40	PVANYD- Cancellable	50	50
			UPR – NC/GR	25	25
			UPR – Cancellable	35	35

SCNILC = Supplementary Contract Not Involving Life Contingency;
NC = Non-Cancellable;
GR = Guaranteed Renewable;
UPR = Unearned Premium Reserve;
PVANYD = Present Value of Amounts Not Yet Due

(a) (*3 points*) List the six categories of deductible reserves, as defined by Section 807(c) of the Internal Revenue Code. Give an example of each.

(b) (*2 points*) Determine whether KVV qualifies as a life insurance company for U.S. federal income tax purposes. Justify your answer.

(c) (*2 points*) Calculate the adjusted total tax reserves, as of 31 Dec 2013, for federal income tax filing purposes. Show all work.

6. **Continued**

(d) (*3 points*) For the items listed below:

1. *Change the valuation interest rate used to calculate tax reserves from 4% to 6% for inforce policies.*

2. *Change to holding waiver of premium reserves for disabled lives (such reserves are currently held for active lives only).*

3. *Policies are converted from collectively renewable to guaranteed renewable.*

4. *The assumption of the timing of death benefit is changed from "end of month" to "mid-month."*

5. *Reserve adjustment due to a defect in the computer software.*

6. *Correction from Method A to Method B as follows:*

   Method A: Calculate disabled life reserves by using two components:

   (1) Future benefits due during the first two years of disability for claims in their first two years.
   (2) Future benefits due for claims beyond their 24-month period as of the valuation date.

   Method B: Calculate disabled life reserves similar to above but add a third component: benefits due after 24 months of disability for claims that had not yet reached their 24th month as of the valuation date.

Determine whether or not each item is a "change in basis," as described in the Internal Revenue Code Section 807(f). Justify your answer.

7. (*5 points*) XYZ is a U.S. life insurance company that has been selling a single premium deferred annuity product (SPDA) with the following features:

- Premium load equals 3%.
- Commission equals 10% of premium and is fully deferrable under U.S. GAAP.
- Annual maintenance expenses are 50 per policy.
- The current interest crediting rate equals the 10 year Treasury rate at the beginning of the policy year, subject to a minimum guaranteed rate of 2%.
- Surrender charges are assessed as a percentage of account value, starting at 5% for the first policy year and grading down to 0% in policy years 6 and later.
- Death benefit equals the surrender benefit.

Existing policyholders can amend their contracts using one of the following options:

- **Option 1**: For an additional premium, XYZ will change the death benefit to equal the surrender benefit plus the initial deposit. No underwriting is required.

- **Option 2**: For a 25 basis point reduction in the current crediting rate, XYZ will increase the minimum guaranteed rate to 2.5%.

- **Option 3**: For no additional charge, the policyholder can exchange their policy for an immediate annuity that pays the policyholder a fixed monthly benefit for the remainder of the policyholder's life.

Explain the impact on the GAAP DAC asset and GAAP unearned revenue liability (URL) of exercising each option. No calculations are required.

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

USE THIS PAGE FOR YOUR SCRATCH WORK

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