SOCIETY OF ACTUARIES

Life Financial Management – U.S.

Exam ILALFMU

Date: Tuesday, May 6, 2025

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 9 questions numbered 1 through 9 with a total of 80 points.

   The points for each question are indicated at the beginning of the question.

2. 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 provided in this document.

Written-Answer Instructions

1. Each question part or subpart should be answered either in the Word document or the Excel document as directed within each question. Graders will only look at work in the indicated file.

   a) In the Word document, answers should be entered in the box marked ANSWER within each question. The box will expand as lines of text are added. There is no need to use special characters or subscripts (though they may be used). For example, β_1 can be typed as beta_1, and x^2 can be typed as x^2.

   b) In the Excel document formulas should be entered. For example, X = component1 + component2. Performing calculations on scratch paper or with a calculator and then entering the answer in the cell will not earn full credit. Formatting of cells or rounding is not required for credit.

   c) Individual exams may provide additional directions that apply throughout the exam or to individual items.

2. The answer should be confined to the question as set.

3. Prior to uploading your Word and Excel files, each file should be saved and renamed with your unique candidate number in the filename. To maintain anonymity, please refrain from using your name and instead use your candidate number.

4. The Word and Excel documents that contain your answers must be uploaded before the five-minute upload period expires.

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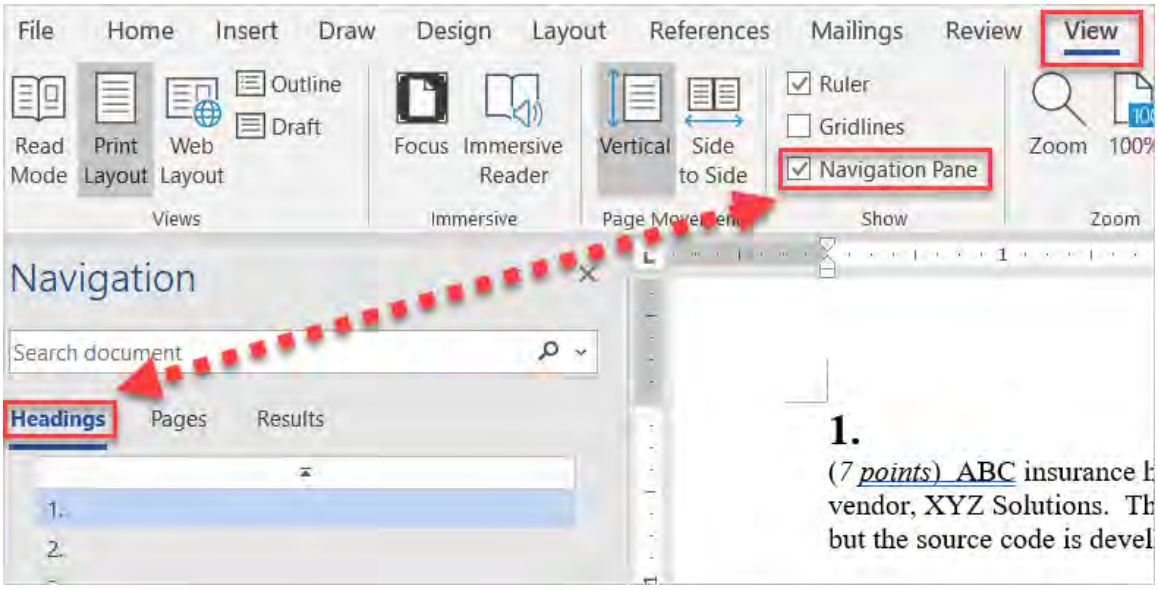
Navigation Instructions

Open the Navigation Pane to jump to questions.

Press Ctrl+F, or click View > Navigation Pane:



1.

(*12 points*) PFD Life sells a universal life product with an Option C death benefit.

(a) (*2 points*) Describe how the following riders and/or features affect the liabilities under US GAAP:

(i) Accelerated death benefits

ANSWER:

(ii) Waiver of deduction rider, where the charge increases with age

ANSWER:

You are given:

- A 1,000,000 face amount policy
- For simplification, assume the Option C death benefit is calculated as face amount plus cumulative premium
- Persistency bonuses and death benefits are paid or assessed at the end of the policy year. All other cash flows occur at the beginning of the policy year.

Policy Year	Premiums (per 1000 face amount)	Percentage of Premium Load	Annual Per Policy Load (per 1000 face amount)	Annual COI Rate	Credited Rate	Guaranteed Interest Rate	Persistency Bonus as % of AV	Lapse Rate
1	60	2.25%	30	0.003200	5.00%	3%	0	15%
2	60	2.25%	20	0.004180	5.00%	3%	0	10%
3	60	2.25%	20	0.005148	5.00%	3%	0	10%
4	60	2.25%	20	0.005814	5.00%	3%	0	10%
5	60	2.25%	20	0.006208	5.00%	3%	0	10%
6	60	2.25%	10	0.006000	5.00%	3%	0	5%
7	60	2.25%	10	0.005670	5.00%	3%	0	5%
8	60	2.25%	10	0.005148	5.00%	3%	0	5%
9	60	2.25%	10	0.004476	5.00%	3%	0	5%
10	60	2.25%	10	0.003795	5.00%	3%	7.50%	100%

1. Continued

(b) (*10 points*) Calculate each of the following at the end of policy year 2:

(i) (*3 points*) Account value

The response for this part is to be provided in the Excel spreadsheet.

(ii) (*3 points*) Sales Inducement Liability

The response for this part is to be provided in the Excel spreadsheet.

(iii) (*3 points*) Unearned Revenue Liability

The response for this part is to be provided in the Excel spreadsheet.

(iv) (*1 point*) Liability for Future Policyholder Benefits

The response for this part is to be provided in the Excel spreadsheet.

Show all work.

2.

(*8 points*)

(a) (*2 points*) Describe the disclosure requirements for Market Risk Benefits (MRB).

ANSWER:

(b) (*2 points*) Describe whether each of the following products requires the calculation of an MRB:

(i) Variable annuity with guaranteed minimum death benefit (GMDB)

ANSWER:

(ii) Universal life death benefit

ANSWER:

(iii) Fixed indexed annuity

ANSWER:

(iv) Single premium fixed deferred annuity with an annuitization guarantee

ANSWER:

2. Continued

(c) (*2 points*) For a variable annuity policy with a rollup GMDB you are given:

At Issue				**At Valuation Date**		
Scenario	PV (Excess Benefits)	PV (Contract Charges)		Scenario	PV (Excess Benefits)	PV (Contract Charges)
1	4,449	6,979		1	565	3,357
2	2,029	5,884		2	340	2,889
3	1,811	5,801		3	252	2,668
4	964	3,623		4	134	2,468
5	712	4,087		5	110	2,346
6	428	4,529		6	65	2,337
7	158	4,762		7	24	2,564
8	12	4,176		8	5	2,415
9	9	4,635		9	3	2,296
10	8	4,914		10	2	2,570

Calculate the MRB reserve on the valuation date. Show all work.

The response for this part is to be provided in the Excel spreadsheet.

(d) (*2 points*) Describe the general change in reserve levels if one of the following designs of the GMDB is used instead of a rollup GMDB:

(i) Return-of-premium design

ANSWER:

(ii) Annual ratchet design

ANSWER:

3.

(*8 points*)

(a) (*2 points*) Identify which Actuarial Guideline XXXIII benefit stream category applies to each of the following:

(i) Making a partial withdrawal

ANSWER:

(ii) Making a full withdrawal by surrendering the contract

ANSWER:

(iii) Death of the annuitant

ANSWER:

(iv) Receiving benefits under a disability rider

ANSWER:

(v) Annuitizing the contract

ANSWER:

(vi) Receiving benefits under a nursing home rider

ANSWER:

3. Continued

(b) (*3 points*) You are given the following information for a single premium deferred annuity contract:

- The valuation date is the annuity contract issue date
- The annuity contract guarantees the credited interest rate for five years at which time the contract matures at the accumulated value.

Single premium deposit	15,000
Credited interest rate	5.50%
Statutory valuation interest rate	5.00%

Surrender charge by contract year				
Year 1	Year 2	Year 3	Year 4	Year 5
4.00%	3.00%	2.00%	1.00%	0.00%

Calculate the contract's reserve under CARVM as of the valuation date considering full surrender benefits only. Show all work.

The response for this part is to be provided in the Excel spreadsheet.

(c) (*3 points*) You are given the following information for a specific issue year:

Time Period	Monthly average of Moody's composite yield on seasoned corporate bonds
3 months	5.53%
6 months	5.64%
12 months	5.56%
24 months	5.57%
36 months	5.46%

	Statutory Valuation Interest Rates	
Guaranteed Duration	Life insurance	Annuity – Type A
5 years or less	4.50%	5.50%
More than 5 years but not more than 10 years	4.50%	5.50%
More than 10 years but not more than 20 years	4.25%	5.00%
More than 20 years	4.00%	4.50%

3. Continued

(i) Identify which rates could be used as the "reference rate" in the dynamic valuation interest rate formula from the 1980 Amendments to the Standard Valuation Law. Justify your answer.

ANSWER:

(ii) You are given the following guaranteed credited interest rates for a single premium deferred annuity issued the same year:

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9 and later
5.10%	4.90%	4.70%	4.50%	4.30%	4.10%	3.90%	3.70%	3.50%

Determine the guaranteed duration to be used in selecting the maximum statutory valuation interest rates for this annuity. Justify your answer

ANSWER:

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4.

(*11 points*) RTS Insurance Company sells a variety of term, UL with secondary guarantee (ULSG), and indexed UL (IUL) policies. RTS does not qualify as a small company.

(a) (*5 points*) Critique the following statements with respect to VM-20:

A. *Post-level term profits may be used to subsidize reserves from other similar products as well as other products which also fall under VM-20.*

ANSWER:

B. *When computing IUL deterministic and stochastic reserves, the starting assets must fall between 98% and 102% of net reserves.*

ANSWER:

C. *Any conservative reinvestment strategy may be used when performing the ALM model run, as long as the reserve is positive.*

ANSWER:

D. *When modeling the Stochastic Reserves, a prescribed set of 100 scenarios must be used.*

ANSWER:

E. *RTS is undergoing a modernization project in which expenses are expected to decrease 10% year over year. Management feels the expected expense reduction can be reflected in VM-20.*

ANSWER:

4. Continued

(b) (*4 points*) You are given the following information:

Product	Whole Life	Term	UL	IUL with material secondary guarantee
PV of net death benefits	400	600	1,000	2,000
Duration of secondary guarantee (in years)	n/a	n/a	1	20
Deterministic Reserve without margins using the baseline scenario	10	20	40	50
Deterministic Reserve with margin using the baseline scenario	15	40	50	70
Largest* Deterministic Reserve without margin	30	50	60	70
Largest* Deterministic Reserve with margin	45	60	70	80
Sum of gross guaranteed premiums	300	400	500	1,000
Sum of valuation net premiums	200	500	600	900

*Largest among the 16 prescribed deterministic scenarios.

Determine which reserves (NPR, DR, SR) under VM-20 need to be calculated for each of the following products:

(i) Whole Life

ANSWER:

(ii) Term

ANSWER:

(iii) UL

ANSWER:

4. Continued

(iv) IUL with material secondary guarantee

ANSWER:

Justify your answer.

(c) (*2 points*) Explain whether COVID should impact any reserve components of VM-20.

ANSWER:

5.

(*8 points*) For a block of level death benefit nonlevel premium term life insurance policies, statutory reserves are determined in accordance with the Valuation of Life Insurance Policies Model Regulation.

(a) (*2 points*) You are given the mortality rates, X-factors, and guaranteed premiums rates for a 25-year term life insurance contract in this block (see Excel spreadsheet). Assume no policy fees.

Determine the contract segments used to calculate segmented reserves.

The response for this part is to be provided in the Excel spreadsheet.

(b) (*6 points*) You are given the guaranteed premiums, contract segments, tabular cost per 1000 of death benefit, and various actuarial present values based on mortality rates applicable for basic and deficiency reserve calculations, for a 35-year term contract (see Excel spreadsheet).

Assume the following:

- Policy was issued July 1, 2014
- Cash value is zero for all years
- Death benefit is 250,000
- Premiums are assumed to be payable annually at beginning of the policy year for reserve calculations

(i) (*5 points*) Calculate the mean reserve for the policy as of Dec. 31, 2024.

The response for this part is to be provided in the Excel spreadsheet.

(ii) (*1 point*) Calculate the deferred premium asset for the policy as of Dec. 31, 2024, assuming actual policy premiums are paid monthly.

The response for this part is to be provided in the Excel spreadsheet.

6.

(*8 points*)

(a) (*2 points*) Describe whether a modified endowment contract (MEC) and a Non-MEC individually owned life insurance contract have the same or different tax treatment for the following:

(i) Death benefits and inside buildup

ANSWER:

(ii) Distributions of investments and income

ANSWER:

(iii) Policy loans

ANSWER:

(iv) Penalty tax

ANSWER:

(b) (*2 points*) Critique the following statements:

A. If the cash surrender value is equal to the death benefit, this is an endowment contract which is not eligible for favorable life insurance tax treatment.

ANSWER:

B. A policyholder owns a Non-MEC life insurance policy with a spouse rider. Upon divorce, the policy will continue to not be a modified endowment contract.

ANSWER:

6. Continued

C. *A policy has a guaranteed 8% first year interest bonus. The CVAT NSP should be calculated using statutory minimum rates.*

ANSWER:

D. *An individual whole life policy has the following riders: accidental death benefits, family term coverage, and long-term care insurance by accelerating the base plan's death benefit. These riders increase the definitional limitation for the contract.*

ANSWER:

(c) (*4 points*) You are given the following for a whole life policy:

Issue age	50
Issue date	Dec. 1, 2022
Face amount	100,000
Guaranteed minimum crediting rate	1%
CSV at beginning of policy year 3	5,000

Calculate the 7-pay premium under each of the following circumstances using the information given in the Excel spreadsheet:

(i) At-issue

The response for this part is to be provided in the Excel spreadsheet.

(ii) A 50,000 face amount increase at the beginning of policy year 3

The response for this part is to be provided in the Excel spreadsheet.

(iii) A 25,000 face amount reduction at the beginning of policy year 3.

Show all work.

The response for this part is to be provided in the Excel spreadsheet.

7.

(*9 points*)

(a) (*2 points*) Compare and contrast a Financial Strength Rating and an Issuer Credit Rating.

ANSWER:

(b) (*1 point*) Explain two ways a credit rating impacts capital charge factors.

ANSWER:

(c) (*6 points*) With respect to the U.S. Risk-Based Capital annual submission, you are given the following:

Tax rate	21%
Capital charge for common stock	30%
Net amount at risk (NAAR)	20,000,000,000
Available capital	350,000,000
Net Required Capital and Target Capital	75,000,000
Number of bonds owned	100
Value of bonds	100,000,000
Average factors of bonds	0.02
Number of unaffiliated common stocks owned	10
Value of common stock	10,000,000

- Assume no concentration risk or operational risk in the calculation.

Issuers	Size Factor
First 50	2.5
Next 50	1.3
Next 300	1
Over 400	0.9

NAAR Factors	Factor
First 500M	0.0023
Next 4,500M	0.0015
Next 20,000M	0.0012
Over 25,000M	0.0009

7. Continued

Calculate the following:

(i) Authorized Control Level

The response for this part is to be provided in the Excel spreadsheet.

(ii) Company Action Level

The response for this part is to be provided in the Excel spreadsheet.

(iii) Best's Capital Adequacy Ratio (BCAR)

The response for this part is to be provided in the Excel spreadsheet.

(iv) Fitch Prism Score

The response for this part is to be provided in the Excel spreadsheet.

Show all work.

8.

(*8 points*)

(a) (*5 points*) You are given:

Risk-free rate	4.00%
Expected rate of return for the market as a whole	17.75%
Company beta	0.80
Market value of debt	300
Market value of equity	700
Required return on debt	5.00%
After-tax investment earnings rate	3.95%
Value of inforce business	100
Adjusted book value	120

Year	0	1	2	3	4	5
Required capital	100	90	80	70	60	0

Calculate the actuarial appraisal value of this block. Show all work.

The response for this part is to be provided in the Excel spreadsheet.

(b) (*3 points*) With respect to a fixed deferred annuity block:

(i) Identify two key risks.

ANSWER:

(ii) Propose a sensitivity for each of the two risks identified in part i. Justify your answer.

ANSWER:

9.

(*8 points*) MSE Life issues a small volume of term life insurance policies. The term design includes a 20-year level premium period followed by annually renewable premiums.

You are given the following cash flow model output:

	Year 1	**PV of Risk Adjusted Cash Flows at Issue**
Premium	35,000	380,000
Commission	5,000	5,000
Underwriting and service expenses	3,350	43,290
Claims	6,500	285,000
Acquisition costs	1,000	1,000
Other Comprehensive Income	50	2,958
Release of contractual service margin	8,500	n/a
Release of risk adjustment	3,500	n/a
Investment income	2,350	25,000

Assume that experience emerges in line with the initial assumptions for Year 1.

(a) (*4 points*) Calculate the following using the general measurement model:

(i) Contractual service margin at issue

The response for this part is to be provided in the Excel spreadsheet.

(ii) Comprehensive income for Year 1

The response for this part is to be provided in the Excel spreadsheet.

Show all work.

9. Continued

(b) (*4 points*) Critique the following statements.

A. *If there is a net cash outflow at inception, a loss component is created for the net cash outflow and the contractual service margin is set to zero. The net cash outflow is reflected in the insurance revenue line as an offset.*

ANSWER:

B. *Reinsurance contracts are still considered insurance contracts even if the contract does not expose the reinsurer to the possibility of a significant loss.*

ANSWER:

C. *MSE Life should recognize the group of reinsurance contracts at the earlier of the beginning of the coverage period or the date the entity recognizes an onerous group of underlying insurance contracts for reinsurance contracts that provide proportional coverage.*

ANSWER:

D. *MSE Life may use the premium allocation approach to measure the liability for remaining coverage (LRC).*

ANSWER:

E. *The premium allocation approach could give a liability for remaining coverage that is close to the general measurement model approach if the entity expects significant variability in fulfillment cash flows under both approaches.*

ANSWER:

***** END OF EXAMINATION*****