Life Product Management

Exam ILALPM

Date: Wednesday, May 10, 2023

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 7 questions numbered 1 through 7 with a total of 60 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 five-digit candidate number in the filename.

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

Navigation Instructions

Open the Navigation Pane to jump to questions.

Press Ctrl+F, or click View > Navigation Pane:
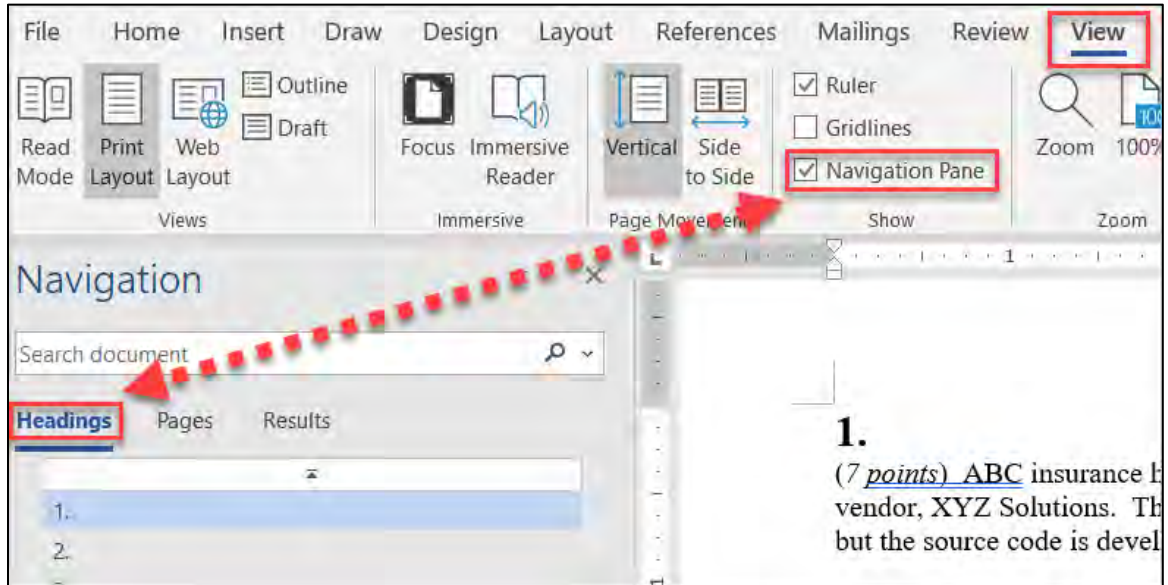
1.

(*8 points*) You have been asked to develop a new mortality table.

(a)   (*4 points*) You are given the following information for a group of policies with attained age 35 at the beginning of the study period:

Situation	Number of policies
Active at beginning and end of study period	1250
Active at beginning of study period, death occurs after 6 months	10
Active at beginning of study period, withdrawal occurs after 9 months	150
Entered study 3 months after beginning of study period, active at end of study period	200
Entered study 3 months after beginning of study period, death occurs 3 months later	5
Entered study 3 months after beginning of study period, withdrawal occurs 3 months later	75

(i)   (*3 points*) Calculate an experience-based mortality rate for attained age 35 policies given this information.

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

(ii)   (*1 point*) Calculate a 95% confidence interval for the mortality rate obtained in part (i).

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

Your company is exploring the use of predictive analytics in the development of the new mortality table.

(b)   (*1 point*) Compare the advantages of using a predictive analytics approach to those of the traditional approach for setting mortality rates.

ANSWER:

(c)   (*1 point*) Describe legal and ethical concerns related to the use of predictive modeling in life insurance.

ANSWER:

1. Continued

(d)   (*2 points*) Assess the implications of the "Generalized Linear Model" and the "Random Forest Approach" in terms of each of the following aspects:

(i)   Explanatory ability

ANSWER:

(ii)   Predictive power

ANSWER:

(iii)   Ease of table implementation

ANSWER:

2.

(*9 points*) JS Life is a mutual life insurer that is launching its first individual Variable Annuity (VA) product. JS Life wants to add a Guaranteed Lifetime Withdrawal Benefit (GLWB) that allows the policyholder to take 5% withdrawals for life.

(a)   (*1 point*) List four relevant profitability metrics that could be used to price the new individual VA product.

ANSWER:

JS Life's Chief Actuary wants to confirm that the new individual VA complies with applicable ASOPs. Specifically, she wants to understand if the following ASOPs apply to the new product:

- ASOP No. 2 – Nonguaranteed Elements for Life Insurance and Annuity products.
- ASOP No. 54 – Pricing of Life Insurance and Annuity Products.

(b)   (*1 point*) Describe the applicability of ASOPs 2 and 54 apply to the VA.

ANSWER:

2. **Continued**

JS Life is developing assumptions for the new VA product with a GLWB.

(c) (*3 points*) Critique each of the following statements:

    A.   *Few VA contracts with lifetime payout riders are funded with qualified money.*

> ANSWER:

    B.   *Source of funding, i.e., qualified or nonqualified, is more important than distribution channel when determining assumptions related to how customers take withdrawals.*

> ANSWER:

    C.   *Policyholders under age 60 are more likely to take withdrawals in amounts less than the maximum allowed.*

> ANSWER:

    D.   *Policyholders with smaller contract values are less likely to take withdrawals that significantly exceed the benefit maximum.*

> ANSWER:

A proposal has been made to allow a dollar-for-dollar reduction in the GLWB benefit base for partial withdrawals in excess of the 5% allowable withdrawal amount.

(d) (*2 points*) Assess the appropriateness of this proposal.

> ANSWER:

2. **Continued**

(e) (*2 points*) Compare and contrast VA and fixed deferred annuities based on the following aspects:

(i) Rate of return on investment

ANSWER:

(ii) Control of assets

ANSWER:

(iii) How insurers generate product revenue

ANSWER:

3.

(*9 points*) You are a group annuity pricing actuary for ABC Life, a large life insurance and annuity company with a large operations department and whose risk appetite favors non-financial over financial risk. Your company wants to bid on a new pension risk transfer (PRT) deal.

(a)   (*2 points*) Explain how to mitigate two main risks underlying assumptions that need to be made for group annuities.

> ANSWER:

You are considering the following cases:

Case 1: A nationwide telecommunications company is looking for a buy-out deal for their defined benefit pension plan that covers over 5,000 current employees and 25,000 retirees.

Case 2: A small, local natural gas company is looking for a buy-in deal of their defined benefit pension plan that was closed 10 years ago, and all participants have retired.

Case 3: A large, regional manufacturing company is looking for a buy-out deal for their defined benefit pension plan that covers only retired participants. Plan benefits are linked to CPI (Consumer Price Index).

(b)   (*5 points*)

(i)   (*3 points*) Describe the risk characteristics of each of the three cases.

> ANSWER:

(ii)   (*2 points*) Recommend which case your company should bid on.

> ANSWER:

3. **Continued**

(c)   (*2 points*)

(i)   Explain why a different longevity assumption might be required for each case.

ANSWER:

(ii)   Identify how ABC Life can reduce the financial impact of incorrectly estimating the assumptions related to longevity.

ANSWER:

4.

(*9 points*) Your company is a leader in the annuity market, with many years of credible annuity data. The company is now expanding to the structured settlement market.

(a)   (*4 points*) Critique each of the following statements:

A.   *Mortality experience from the existing annuity block can be used to price the new structured settlement product, since it is just a different type of annuity.*

ANSWER:

B.   *Underwriting process for substandard risks associated with the structured settlement can follow the same underwriting methodology used in the company's life insurance business.*

ANSWER:

C.   *It is important for the company to cash flow match expected asset and liability cash flows on the structured settlement block to reduce the investment risk.*

ANSWER:

D.   *In designing the benefit of structured settlement, the company must consider nonforfeiture benefits.*

ANSWER:

4. **Continued**

(b) (*2 points*) With respect to the reserves on substandard lives of the structured settlement product:

(i) Describe the treatment of total expected cashflows.

ANSWER:

(ii) Describe the statutory reserving method to be used.

ANSWER:

(iii) Describe the valuation interest rate to be used.

ANSWER:

(c) (*3 points*) You are analyzing the risks for the structured settlement product.

(i) Describe the impact on the product's risk profile if the benefit is to increase 2% annually.

ANSWER:

(ii) Describe how the company can manage the risk of falling interest rates when preparing an initial pricing quote.

ANSWER:

(iii) Recommend two solutions to mitigate the risk of falling interest rate between the time the case was quoted and closed.

ANSWER:

5.
(*6 points*)

(a)   (*4 points*) You are developing a framework that measures the economic value created by your company's life insurance contracts.

    (i)   (*1 point*) Explain how insurers differ from investment funds in value creation.

> ANSWER:

    (ii)   (*3 points*) You are provided with the following cash flows of a level term policy, payable over three years as shown in the table below:

Time	At inception	EOY 1	EOY 2	EOY 3
Premiums	40	40	40	--
Claims	--	20	30	55
Expenses	7.5	2.5	2.5	2.5
Risk capital	15	10	8	--

Furthermore, assume the following simplifications:

- All future cash flows are paid at the end of each year
- Only frictional risk capital costs are considered
- Risk capital costs amount to 3% of risk capital at the start of each year
- A risk-free discount rate of 4% per annum can be used for all maturities

Calculate the economic value of this contract at inception using zero coupon bonds to construct a replicating portfolio for this contract's cash flows.

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

5. Continued

(b) (*2 points*) Place the following profit measures in the table below. Justify your answer.

    (i)   Embedded Value (EV)

    (ii)   ROE

    (iii)   Operating Profit (OP)

    (iv)   Market Consistent Embedded Value (MCEV)

	Comprehensiveness of measure	
High Comprehensibility/ Transparency of measure		Not Available
	Not Relevant	
Low	Low	High

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

6.

(*9 points*) TPL Life is seeking to transfer a portion of investment risk on a block of Universal Life business via reinsurance. They will partner with XYZ Re, a newly established reinsurer, for this transaction.

Although the statutory reserves will be ceded to XYZ Re, TPL Life wishes to retain control over the investment strategy of the assets backing the reserves, as well as limit their counterparty credit exposure. In addition, TPL Life intends to recapture the underlying business eventually.

(a)   (*2 points*) Propose an appropriate reinsurance method for TPL Life. Justify your answer.

ANSWER:

(b)   (*4 points*) The following information is provided for the transaction:

General Assumptions (for all years)	
Coinsurance percentage	80%
Invested assets earned rate	8%
Allowance percentage	20%
Year 1 Projections	
Direct premium	100
Gross death benefits	0
Risk charge	0
Experience refund	0
Year 2 Projections	
Direct premium	80
Gross death benefits	10
Increase in reserve	30
Risk charge	3
Experience refund	6

6. Continued

      (i)   (*2 points*) Calculate the total amount due to XYZ Re at the end of Year 2 under coinsurance

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

      (ii)   (*1 point*) Calculate the total amount due to XYZ Re at the end of Year 2 under funds withheld coinsurance

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

      (iii)   (*1 point*) Calculate the funds withheld balance at the end of Year 2 under funds withheld coinsurance

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

Show all work.

(c)   (*3 points*) Critique each of the following statements with respect to reinsurance in general, and not related to the TPL company information above:

    A.   *While yearly renewable term reinsurance can be a cost-effective solution to transfer mortality risk, it provides little surplus benefit to the ceding company.*

> ANSWER:

    B.   *Modified coinsurance is not an appropriate solution for ceding companies focused on developing policyholder dividend scales or interest credits.*

> ANSWER:

    C.   *Pure coinsurance provides the benefit of minimizing capital gains and losses on assets at initiation of the reinsurance.*

> ANSWER:

7.

(*10 points*)

(a) (*1 point*) Describe the protective and predictive benefits of using data base credit scores.

ANSWER:

(b) (*1 point*) Outline the primary high-level findings of the assessment of stratifying mortality risk using the LexisNexis® Risk Classifier.

ANSWER:

7. **Continued**

You are given the following information about an insurance company:

- The company sells and has a sizeable block of fully underwritten life insurance, annuities and Property & Casualty (P&C) policies.
- The company has recently started marketing and selling a Whole Life (WL) product for the final expense market targeting ages 50 to 85.
- The following is sales data by distribution channel in the first twelve months for this new WL product.

Distribution Channel	Average Age	Premium Sold (millions)	Avg Risk Classifier Issued Score
Direct Marketing P&C	67	25	500
Captive Agents	70	25	600
Independent Agents	55	50	350
Aggregation	**62**	**100**	**450**

Distribution Channel	Target Market
Direct Marketing P&C	P&C customers currently aged 50 and above.
Captive Agents	Existing older age life insurance policyholders
Independent Agents	• In-force term policyholders at the end of the level premium period • Current annuity contract holders

The simplified issue underwriting application for this new WL product has only two questions:

1. Whether the potential insured has used tobacco in the last two years, which leads to nonsmoker and smoker distinct premium rates.
2. Whether the potential insured has been admitted to a hospital within the last thirty (30) days, which disqualifies the insured from coverage if affirmative.

- The company uses the LexisNexis® Risk Classifier to monitor the relative mortality performance of each distribution channel.
- The distribution of pricing issue ages and risk classifier scores align relative to the LexisNexis® and Munich Re study with an average score of 500.

7. Continued

(c)   (*4 points*) Evaluate the impact on profitability of the new WL product with respect to each distribution channel.

> ANSWER:

(d)   (*4 points*) Recommend four changes to the underwriting or product design to improve both the sales and profitability of the new WL product.

> ANSWER:

END OF EXAMINATION