

Exam ILA 101

Date: Monday, March 23, 2026

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 7 questions numbered 1 through 7 with a total of 50 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.

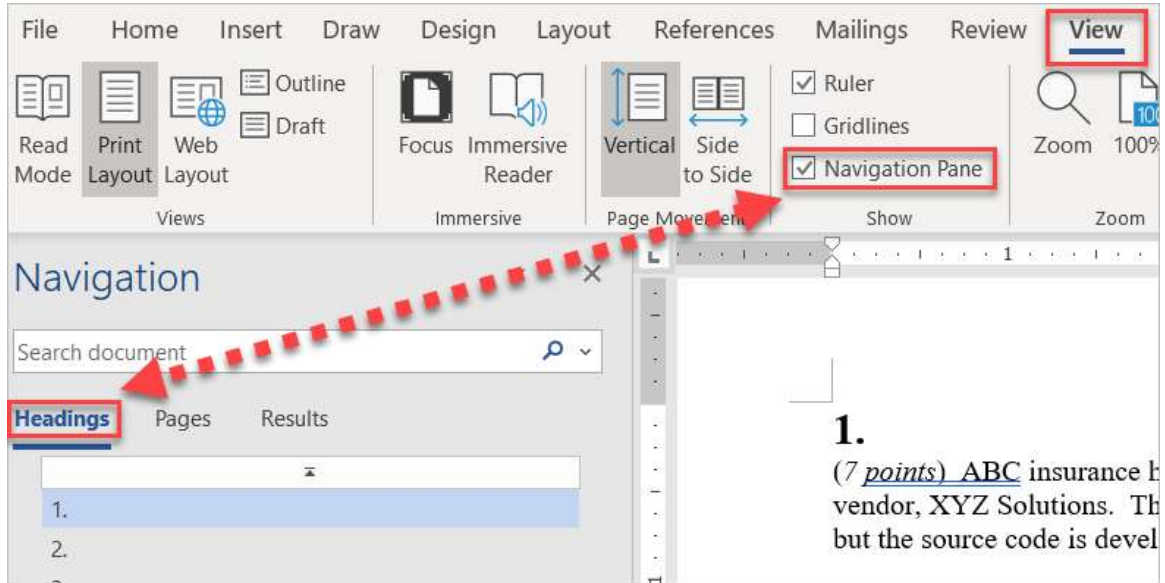
Written-Answer Instructions

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, $X = \text{component1} + \text{component2}$. 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 use your candidate number instead.
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 are given the following information for a cohort of 10-year term policies:

- Premiums are level for the duration of the term
- Benefits are level for the duration of the term
- No cash values are applicable
- Premiums are annual and paid at the beginning of the year
- Death benefits are paid at the end of the year
- Assume no lapses
- Current discount rate is the same as the constant locked-in discount rate
- Number of policies in cohort: 1,000
- Average units per policy: 100

Policy Year	1	2-10
Premium per Unit	3	3
Locked-in Discount Rate	3.00%	3.00%
Commission Rate (% of Premium)	80%	2%
Per Policy Total Acquisition Expense	100	0
Per Policy Direct Acquisition Expense	50	0
Per Policy Maintenance Expense	35	35
Per Death Claims Expense	1,000	1,000
Premium Tax	2.25%	2.25%

Policy Year	Per Policy Mortality Rate
1	0.0017
2	0.0021
3	0.0025
4	0.0028
5	0.0029
6	0.0035
7	0.0037
8	0.0039
9	0.0041
10	0.0045

(a) (3 points) Calculate the US GAAP net premium ratio at issue for the term cohort.

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

1. Continued

- (b) (2 points) Calculate the US GAAP reserve at issue for the term cohort.

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

- (c) (2 points) Calculate the DAC amortization for year 1 for the term cohort.

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

- (d) (1 point)

- (i) (0.5 points) Describe how often cash flow assumptions for GAAP benefit reserves should be reviewed.

ANSWER:

- (ii) (0.5 points) Describe one potential circumstance where cash flow assumptions might be revised outside of the normal schedule.

ANSWER:

2.

(6 points) GRL Life sells a portfolio of universal life (UL) and variable universal life (VUL) products in a jurisdiction where IFRS 17 is the prevailing financial reporting standard. Their VUL product has a no-lapse guarantee.

GRL Life is concerned about a potential major decline in stock prices because of a supply disruption which is expected to persist.

- (a) (2 points) Analyze potential impacts of a decline in stock prices on the profitability of the VUL block.

ANSWER:

You are given the following information for a 20-year fixed premium UL product primarily marketed to insureds age 65-85:

- Cost of insurance and expense charges cannot be increased
- Crediting rate is fixed and guaranteed
- There are no surrender charges

- (b) (1 point) Explain how GRL Life can determine whether the above contract has a significant possibility of becoming onerous at inception under IFRS 17.

ANSWER:

- (c) (3 points) Assess whether each of the following contracts in GRL's UL portfolio can be considered a direct participating contract under IFRS 17.

- (i) (1 point) UL contracts with a minimum crediting rate of 3%. The Company uses its discretion to pay more than the minimum rate. The final crediting rate is expected to reflect overall investment performance of the Company.

ANSWER:

- (ii) (1 point) VUL contracts where account values vary directly with separate account performance. The Company deducts a small management fee from the account value.

ANSWER:

2. Continued

- (iii) (*1 point*) Index-linked UL contracts where returns on account values are tied to a stock index. The Company does not hold a portfolio of assets reflecting the index.

ANSWER:

3.

(7 points)

(a) (4 points) Critique the following statements related to the taxation of US life insurance policies.

A. *The tax status of life insurance policies issued prior to January 1, 1985 is defined by IRC section 101(f), while policies after this date are defined by IRC section 7702. In both cases, policies must pass the Guideline Premium Test in order for death benefits to be nontaxable.*

ANSWER:

B. *IRC Section 7702A determines whether a policy is a Modified Endowment Contract (MEC). If a policy is a MEC, then the full amount of any surrenders and policy loans are taxable as ordinary income.*

ANSWER:

C. *Under IRC Section 7702, death benefits are exempt from treatment as income for the purpose of income tax, while the inside build-up of the cash value is considered to be taxable income.*

ANSWER:

D. *Policies that qualify under both the Cash Value Accumulation Test of IRC Section 7702(b) and the Guideline Premium Test of IRC section 7702(c) and (d) must guarantee compliance by the terms of the contract. Corridor factors used under both tests are identical.*

ANSWER:

3. Continued

You are given the following information about a single-premium permanent life insurance policy:

- The death benefit is 1,000 and level in all years
- The cash value at the time of issue is 250
- The guaranteed nonforfeiture interest rate is 5%
- The policy qualifies as life insurance under section 7702 using the Cash Value Accumulation Test (CVAT)
- The net single premium for the policy 7 years after issue is 500 when calculated using the assumptions applicable to the CVAT

Age	Mortality Rate
x	0.0003
x+1	0.0005
x+2	0.0009
x+3	0.0015
x+4	0.0025
x+5	0.0045
x+6	0.008

(b) (3 points) Calculate the following values at issue:

(i) (1 point) Initial CVAT net single premium

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

(ii) (1 point) Initial minimum death benefit under CVAT

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

(iii) (1 point) Initial 7-pay annual premium

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

4.

(7 points) EAI Life is a large insurer selling life insurance and annuity products. They are reviewing the assumptions and pricing of their annuity portfolio.

- (a) (1 point) Analyze the impact on profitability of using EAI's life insurance pricing mortality assumptions for pricing an annuity product.

ANSWER:

One of the products being repriced is a deferred annuity with a bailout provision. The profit margin for this product was calculated using the following two approaches:

1. Profit margin calculated using a level, best-estimate earned interest rate assumption.
2. Profit margin calculated using the median result generated by the dynamic interest rate scenarios.

- (b) (2 points) Contrast how the profit margin may differ under the two approaches.

ANSWER:

EAI Life is also considering issuing a variable annuity (VA) with a guaranteed minimum withdrawal benefit (GMWB).

- (c) (3 points) Critique the following statements.

A. *For variable annuities with living benefits, separate account performance is not a significant driver of persistency and therefore does not materially impact profitability.*

ANSWER:

B. *The majority of partial withdrawals on variable annuities with living benefits are taken through systematic withdrawal plans (SWPs). This is because withdrawals through SWPs are typically greater than the annual benefit maximum.*

ANSWER:

4. Continued

- C. *Surrender charges and market value adjustments (MVAs) are two effective methods of increasing persistency on variable annuity products.*

ANSWER:

- D. *There is a higher risk of withdrawal on non-qualified variable annuity contracts than qualified variable annuity contracts. Owners age 65 and older of non-qualified annuities are more likely to take withdrawals significantly in excess of the maximum withdrawal amount.*

ANSWER:

- (d) (1 point) Explain how predictive modelling can be used instead of univariate analysis to develop GMWB utilization assumptions.

ANSWER:

5.

(7 points) BLR Life is exploring reinsurance options to help achieve the company's objectives of managing risk and improving their capital position. They are considering the following reinsurance structures offered by CBA Reinsurance Company:

- Yearly Renewable Term (YRT) Reinsurance
- Coinsurance

(a) (1 point) Compare the effectiveness of each type of reinsurance structure to achieve the company's objectives.

ANSWER:

You are given:

- Investment income and interest are paid at the beginning of the year
- There are no income taxes
- There are no claims or surrenders
- Policy assumptions and proposed reinsurance transaction assumptions are given in the Excel template.
- BLR Life's Gain of Operations and Balance Sheet without reinsurance for years 1 and 2 are given in the Excel template.

(b) (5 points) Construct the year 1 and 2 gain from operations and balance sheet for BLR Life and CBA Re using the following reinsurance structures:

(i) (2.5 points) YRT

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

(ii) (2.5 points) Coinsurance

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

(c) (1 point) Recommend a reinsurance structure for BLR Life based on part b. Justify your answer.

ANSWER:

6.

(8 points) Your company sells a variable single premium deferred annuity (SPDA) with a guaranteed minimum accumulation benefit (GMAB). The GMAB guarantees the single premium accumulated at the GMAB accumulation rate.

You are given the following:

Initial Premium	100,000
M&E Fee (% of fund value)	1.5%
Rider Fee (% of fund value)	1.0%
GMAB Term (years)	10
GMAB Accumulation Rate	3%
Acquisition Expense (% of initial premium)	6.0%
Annual Maintenance Expense	500
Annual Decrement Rate (at end of year)	2%
Annual Fund Return	5%
Implied Market Volatility of Fund	20%
Annual Risk-Free Rate	4%

- All fees and expenses occur at the beginning of the year

- (a) (3 points) Calculate the present value of the expected profit to the insurer at time 0. Show all work.

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

- (b) (3 point) Explain the impact to the insurer’s risk profile for the following:

- (i) (1 point) The variable annuity is sold without the GMAB rider.

ANSWER:

- (ii) (1 point) The underlying fund return is negative over the GMAB period.

ANSWER:

6. Continued

- (iii) (1 point) The insurer purchases a put option at issue.

ANSWER:

The company decides to purchase a put to hedge against the GMAB exposure but is concerned about cost.

- (c) (2 points) Describe the expected change to the no-arbitrage cost of the GMAB for each of the following product design changes:

- (i) (1 point) Increase the rider fee from 1.00% to 2.00%.

ANSWER:

- (ii) (1 point) Require 50% allocation to a bond fund which will reduce the implied volatility from 20% to 15%.

ANSWER:

7.

(7 points) QWG Life is a stock insurance company that reports financial results under both US GAAP and US statutory frameworks. Cash flow and balance sheet information is given in the Excel template.

- (a) (3 points) Calculate after-tax stockholder earnings for years 1 through 6.

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

- (b) (3 points) Calculate return on equity for years 1 through 6, where equity is defined as the average of stockholder equity at the beginning and end of the year.

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

QWG is considering using either solvency earnings or stockholder earnings as the profit metric for pricing a new product. The company is focused on improving its financial strength rating.

- (c) (1 points)

- (i) (0.5 points) Explain how solvency earnings are different than stockholder earnings.

ANSWER:

- (ii) (0.5 points) Recommend the most suitable profit metric based on QWG's objective. Justify your answer.

ANSWER:

****END OF EXAMINATION****