

# Exam ILALFMU

**Date:** Monday, November 8, 2021

## INSTRUCTIONS TO CANDIDATES

### General Instructions

1. This examination has 10 questions numbered 1 through 10 with a total of 100 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

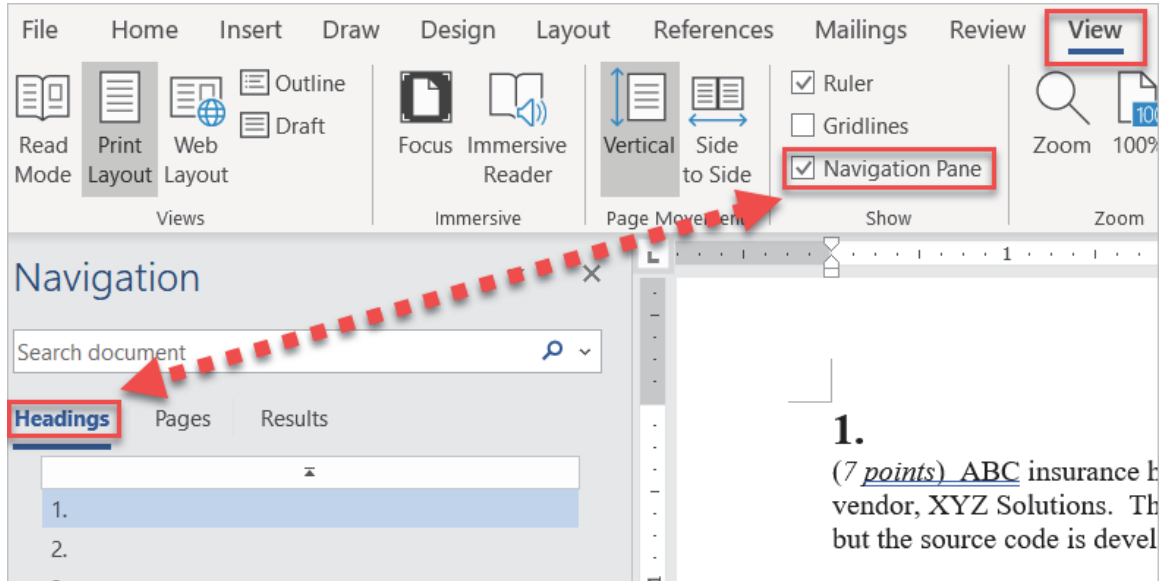
1. Each question part or subpart should be answered either in the Word document or the Excel document as directed within each question. Graders will only look at work in the indicated file.
  - a) In the Word document, answers should be entered in the box marked ANSWER within each question. The box will expand as lines of text are added. There is no need to use special characters or subscripts (though they may be used). For example,  $\beta_1$  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 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.

*Canadian version of this exam is recognized by the Canadian Institute of Actuaries.*

## Navigation Instructions

Open the Navigation Pane to jump to questions.

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



# 1.

(13 points)

- (a) (1.5 points) Describe the three A.M. Best Opinion Outlooks.

ANSWER:

- (b) (2.5 points) Critique each of the following statements regarding AM Best's Credit Rating process for an insurance company:

A. *A recommended rating is developed by a Rating Analyst whose interactions with the insurance company's management are restricted to ensure an independent and unbiased rating.*

ANSWER:

B. *The Rating Analyst's recommendation is reviewed and modified, as appropriate, by a rating review committee before it is voted on and approved by the committee.*

ANSWER:

C. *The process relies almost entirely on quantitative measures including analysis of accounting ratios, balance sheet strength and key management performance indicators.*

ANSWER:

D. *The process only considers information available from public sources. AM Best assumes the information is reliable and does not audit it.*

ANSWER:

E. *Upon reaching a rating decision, if the insurance company does not agree with the rating, AM Best will give the company 30 days to provide additional information that could reasonably be expected to influence the decision. If the company is able to provide such information, AM Best will reevaluate its decision; otherwise, the rating will be released to the public at the end of the 30 days.*

ANSWER:

## 1. Continued

(c) (3 points) Insurance company stakeholders include the following:

- Bondholders
- Stockholders
- Regulators
- Policyholders

Describe the relevance of the following ratings to each of the four stakeholders:

(i) AM Best's Issuer Credit Rating

ANSWER:

(ii) AM Best's Financial Strength Rating

ANSWER:

ABC Bank and DEF Life have independently prepared actuarial appraisals as part of a competitive bidding process to acquire XYZ Life. DEF's appraisal resulted in a higher value than ABC's. ABC Bank currently does not have any insurance operations while DEF Life is one of the largest global life insurers. XYZ Life is a small life insurer offering products similar to those of DEF Life.

(d) (3 points) Identify four differences between the inputs to an actuarial appraisal and the inputs to an AM Best Issuer Credit Rating.

ANSWER:

(e) (3 points) Describe possible reasons why DEF's appraisal value is higher than ABC's, considering each of the three main components of an actuarial appraisal.

ANSWER:

## 2.

(9 points) PCLC Life Insurance Company is currently an A-rated company by S&P. The company has recently implemented economic capital models in order to explore the implications of various capital levels on multiple key business objectives.

The following information is provided:

- Risk threshold by financial variables

<b>Financial Variable</b>	<b>Risk Threshold-Name</b>	<b>Risk Threshold-Quantity</b>	<b>Company Rating</b>
RBC Ratio	Default	100% of authorized level	D or Below
S&P Capital Adequacy Ratio (CAR)	One-Notch Downgrade	150%	BB or Below

- Simulated capital information

	<b>RBC Default</b>	<b>S&amp;P CAR</b>
<b>Probability of One-Notch downgrade or default over 1 year</b>	0.05%	2%
<b>Value at Risk (VaR) of RBC or S&amp;P CAR</b>	160%	190%
<b>Mean of risk capital</b>	650,000	740,000
<b>Annual Discount Rate</b>	3%	4%

- (a) (2 points) Calculate the amount of RBC and S&P capital available for release for year 1. Show all work.

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

## 2. Continued

(b) (2 points) You are given the following additional capital information:

- Capital available for release based on the current economic capital model with VaR 99.5 over 1 year: 400,000
- Capital available for release in year 2

<b>Financial Variable</b>	<b>Year 2</b>
RBC (Default)	-50,000
S&P CAR (Downgrade)	500,000

Contrast the difference between PCLC's results when using the economic capital method versus the multi-objective approach.

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

## 2. Continued

(c) (5 points) Critique the following statements:

A. *Economic capital is a key measure of risk from a regulatory perspective and used only for capital adequacy.*

ANSWER:

B. *In consideration of all stakeholders' risk and capital adequacy objectives, the economic capital method is an appropriate measure. All current capital approaches apply only to the insurance industry.*

ANSWER:

C. *A similarity in the RBC ratio and S&P CAR is that both have a real consequence if you fall below a certain threshold and both have a solvency focus. Risks in RBC ratio are modeled and calibrated based on industry experience, but S&P CAR is based on company experience.*

ANSWER:

D. *One of the advantages of VaR, relative to CTE, is that it can lead to consistent results when aggregating capital.*

ANSWER:

### 3.

(7 points) XBM Insurance Company sells guaranteed investment contracts (GICs).

You are given:

- XBM's GICs are fixed rate contracts with no withdrawal benefits before maturity
- Their corporate bond portfolio includes 1,000 different bonds that were issued by 500 different issuers.

RBC size factors:

Issuers	Size Factors
First 50	2.5
Next 50	1.3
Next 300	1.0
Over 400	0.9

- (a) (1 point) Calculate the risk-based capital (RBC) weighted size factor for XBM's bond portfolio. Show all work.

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

- (b) (2 points) Describe how XBM should evaluate each of the RBC C-3 risks for its GICs.

ANSWER:



### 3. Continued

- (c) (2 points) For a particular scenario for C-3 Cash Flow Testing, you are given annual projected surplus results and the projected one-year Treasury rates for that scenario. Assume a 21% tax rate.

t	Surplus(t)	Treasury(t)
1	-30	2.0%
2	-50	3.0%
3	-30	4.0%
4	0	4.0%
5	30	4.0%
6	60	4.0%
7	90	4.0%
8	120	4.0%
9	140	4.0%
10	130	4.0%
11	120	4.0%
12	110	4.0%
13	100	4.0%
14	80	4.0%
15	60	4.0%
16	30	4.0%
17	0	4.0%
18	-20	3.0%
19	-50	2.0%
20	-80	1.0%

Calculate the scenario-specific C-3 measure. Show all work.

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

### 3. Continued

(d) (2 points) You are given the following items from XBM's balance sheet:

- The investment portfolio is 2,000
- GIC Liability is 990
- Debt issued is 950
- Total assets are 2,000

You are also given:

- Par amounts for both the GIC liability and the debt issued are 1,000 each
- The risk capital associated with the investment portfolio is 200

Construct the risk-capital balance sheet.

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

**4.**

(10 points)

- (a) (4 points) You are given the following data for a variable life insurance contract:

	12/31/2019	12/31/2020
Net surrender value	1,180	1,375
Separate account reserve under Section 817 of the Internal Revenue Code	1,200	1,385
Amount determined using the tax reserve method otherwise applicable to the contract	1,380	1,540
Statutory reserve excluding the deficiency reserve	1,370	1,510
Statutory deficiency reserve	120	105

Calculate the deduction for the increase in reserves on the 2020 tax return. Show all work.

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

#### 4. Continued

- (b) (6 points) QRS Life is a U.S. life insurance company. You are given the following information for a block of level premium term life policies issued by QRS at the beginning of 2022:

- Projected values

Year	Premium	Insurance In Force at Beginning of Year
2022	15,000	1,500,000
2023	14,700	1,470,000
2024	14,400	1,440,000
2025	14,100	1,410,000
⋮	⋮	⋮
<b>Total</b>	<b>250,000</b>	<b>25,000,000</b>

- First year commission: 15% of premium
- Renewal year commission: 3% of premium
- All other expenses are a level percentage of premium

Assume:

- QRS has adopted Long-Duration Targeted Improvements (LDTI) for GAAP and has elected the amount of insurance in force as the constant level basis for amortizing deferred acquisition costs over the life of the contracts
- QRS is a calendar year taxpayer and has more than 15 million of specified policy acquisition expenses each year

- (i) Calculate the expected amount of GAAP DAC amortization in 2023. Show all work.

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

- (ii) Calculate the expected amount of DAC Tax amortization in 2023. Show all work.

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

**5.***(11 points)*

- (a) *(6 points)* You are given the following for an indexed universal life insurance policy issued on 12/31/2016:

<b>Participation Rate (PR)</b>	75%
<b>Participation Cap (PC)</b>	10%
<b>Participation Floor (PF)</b>	1.5%
<b>Participation Margin (PM)</b>	0.5%
<b>Option cost on the issue date</b> (expressed as a percentage of the indexed portion of the fund value)	3.0%
<b>Historical moving average option cost</b> (expressed as a percentage of the indexed portion of the fund value)	2.5%
<b>Statutory valuation interest rate</b>	4.0%
<b>Actuarial Guideline 36 reserve method</b>	Implied Guaranteed Rate Method (IGRM)

The S&P 500 Index had the following values on the shown dates:

<b>12/31/2016</b>	2,252
<b>12/31/2017</b>	2,684
<b>12/31/2018</b>	2,791
<b>12/31/2019</b>	3,231
<b>Maximum between 12/31/2016 and 12/31/2019</b>	3,248
<b>Minimum between 12/31/2016 and 12/31/2019</b>	2,245

## 5. Continued

Calculate the following rates to be applied to the indexed portion of the fund balance:

- (i) Indexed credited interest rate applied at the end of 2019 using the Point-to-Point Method with a 3 year participation period.
- (ii) Indexed credited interest rate applied at the end of 2019 using the High-Water Mark Method with a 3 year participation period.
- (iii) Indexed credited interest rate applied during the initial participation period in the calculation of the guaranteed maturity fund values
- (iv) Indexed credited interest rate applied after the initial participation period in the calculation of the guaranteed maturity fund values

Show all work.

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

- (b) (1 point) List four of the “Hedged as Required” criteria that must be met for the Implied Guaranteed Rate Method in Actuarial Guideline 36.

ANSWER:

## 5. Continued

(c) (4 points) Critique each of the following statements regarding GAAP valuation of the embedded derivative in an equity-indexed universal life policy:

A. *The appreciation in the account value arising from the equity-indexed feature is an embedded derivative requiring bifurcation. If the death benefit amount is also dependent on the cumulative return of the index, then that feature is also an embedded derivative requiring bifurcation.*

ANSWER:

B. *Embedded derivatives requiring bifurcation are reported at fair value on the balance sheet, and any gains or losses resulting from changes in the fair value are recognized in current earnings.*

ANSWER:

C. *The valuation of embedded derivatives requiring bifurcation should be based on assumptions about the future performance of the equity index. These assumptions can be obtained from any reliable source and do not necessarily have to be based on current market conditions.*

ANSWER:

D. *The valuation of embedded derivatives requiring bifurcation should consider the credit risk of the insurance company issuing the policy as well as the credit risk of the insurance company's counterparties.*

ANSWER:

## 6.

(9 points) You are given the following negotiated terms and assumptions about a level premium non-participating whole life insurance product to be reinsured:

- Ceding company: JKC
- Reinsurer: BJB
- Premiums are paid at the beginning of the year
- Death benefits paid in the middle of the year.

Coinsurance rate	75%
Face amount	1000
1st year mortality rate	0.008
Investment Rate	4%
JKC's benefit reserve before reinsurance	5
JKC's 1 year NAR	200
1st year YRT rate (per 1000)	1.5
Present value of mortality expense reimbursed / present value of ceded premium income	0.7

(a) (3 points) Calculate the FAS60 ceded benefit reserve at the end of year 1 on the following alternative reinsurance arrangements:

(i) Coinsurance

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

(ii) YRT

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

Show all work.



## 6. Continued

(b) (6 points) Critique the following statements:

A. *The information given is sufficient to demonstrate that JKC has fulfilled the requirements necessary to qualify for reinsurance treatment under FAS 113.*

ANSWER:

B. *As long as a contract qualifies for reinsurance accounting under FAS 113, the ceding company should report liabilities on reinsured contracts net of the effects of reinsurance. In assumption reinsurance, if the ceding company incurs a loss due to the assumption arrangement, that loss should be amortized over the contract period.*

ANSWER:

C. *Reinsurance on contracts classified as investment contracts for GAAP sometimes qualify for reinsurance accounting under FAS 113, such as single-premium deferred-annuity contracts. The accounting treatment is the same as other reinsurance arrangements.*

ANSWER:

D. *After the reinsurance contract takes effect, the PBR statutory reserve from the perspective of JKC uses best estimate assumptions. Unlike in GAAP, the PBR gross and ceded reserves should be reported on an aggregated basis. The PBR has a net premium reserve floor using company specified assumptions.*

ANSWER:

E. *Compared to YRT, ceded reserves are lower for a coinsurance structure, and first year profits are generally higher for coinsurance.*

ANSWER:

F. *Both a YRT and a coinsurance arrangement can result in profits, net of reinsurance, that are a level percentage of premiums.*

ANSWER:

## 7.

(9 points) LGA Life is a US based insurer with a diverse book of business.

- (a) (1 point) Describe how existing US capital standards differ from an International alternative such as Solvency II.

ANSWER:

- (b) (2 points) Describe four principles of the NAIC's Solvency Modernization Initiative.

ANSWER:

## 7. Continued

- (c) (4 points) You are given the following information on LGA's Year End balance sheet entries:

<b>Assets</b>	<b>STAT</b>	<b>GAAP</b>
Bonds	112	117.60
Mortgage Loans	45	47.25
Stocks	30	30
Stocks in Subsidiary	10	10
Cash	15	15
Premiums Due	2	2
Separate Account	40	40

<b>Liabilities</b>	<b>STAT</b>	<b>GAAP</b>
Term Life Reserves	75	71.25
Income Annuity Reserves	120	114
Claims Payable	1	1
Policyholder Dividends Payable	4	2
Separate Account Liabilities	40	40
AVR	3	0
IMR	2	0

<b>Other Information</b>	<b>Values</b>
Life Insurance Face Amount In Force	900
Policy Count	3000
Annual Premiums	8
Subsidiary RBC Amount	2

<b>Aggregate RBC Factors</b>	<b>Factor</b>
C1 – Bonds	1%
C1 – Mortgages	1.50%
C1 – Stocks	30%
C1 – Cash	0%
C2 – Life Insurance	0.05%
C3 – Life Reserves	1.54%
C3 – Annuity Reserves	0.77%
C4 – Operational	3.08%
Tax Rate	21%

## 7. Continued

Authorized Control Level Risk-Based Capital Formula:

$$0.50 \cdot \left[ C_0 + C_{4a} + \sqrt{(C_{1o} + C_{3a})^2 + (C_{1cs} + C_{3c})^2 + C_2^2 + C_{3b}^2 + C_{4b}^2} \right]$$

Determine whether your company has triggered any regulatory action level. Show all work.

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

## 7. Continued

(d) (2 points) Critique the following statements:

A. *Insurance Holding Company regulation applies when any new Insurance Company is formed by a non-insurance group.*

ANSWER:

B. *The ORSA is a qualitative regulatory review conducted annually by regulators on an insurer's solvency and risk management processes.*

ANSWER:

C. *The main advantages of the NAIC is its ability to compel members to adopt policy and model legislation, and the authority to represent the US internationally on insurance issues.*

ANSWER:

D. *Covered Agreements are needed between US States to ensure that an insurer domiciled in one state can operate in all the others.*

ANSWER:

## 8.

(10 points)

(a) (4 points) Critique the following statements about VM-31:

A. *Because the requirements of VM-31 are less stringent than the old AG43, companies will need to decrease the amount of detail shown in complying with minimum reserve requirements.*

ANSWER:

B. *When determining the mortality assumption under VM-31, a company has discretion to segment their population. For example, they can lower reserves by reducing the amount of deaths expected based on the segments chosen.*

ANSWER:

C. *Premium payment pattern sensitivities are recommended under VM-31, but insurers can only change modelled premium payment patterns once every three years.*

ANSWER:

D. *Non-guaranteed element assumptions and policyholder behavior assumptions can be developed independently of each other as long as it is documented in the report.*

ANSWER:

## 8. Continued

(b) (3 points) Describe the minimum reserve components required to be calculated under VM-20 for each of the following blocks:

(i) Term policies that pass the stochastic exclusion test

ANSWER:

(ii) Indexed UL policies with no secondary guarantees and without a clearly defined hedging strategy that pass the stochastic exclusion test

ANSWER:

(iii) UL policies with lifetime secondary guarantees that do not pass the stochastic exclusion test

ANSWER:

(c) (3 points) Calculate one of the scenario reserves for the VM-20 stochastic reserve assuming the following information.

Projection Period (y)	Statement Value of Assets	One-Year Forward Treasury Rate
0	11,350	
1	-915	1.83%
2	-970	0.25%
3	1,065	1.56%
4	-900	0.10%
5	-1,105	0.89%
6	-875	0.12%
7	-1,000	2.60%
8	-1,125	0.15%
9	-920	0.61%
10	9,450	0.29%

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

## 9.

(11 points) You are given the following policies:

Policy A	20-year level premium term issued in 2015
Policy B	Whole life with increasing death benefit issued in 2015
Policy C	10-pay level death benefit whole life issued in 2015
Policy D	Level death benefit whole life issued in 2019
Policy E	20-year level premium term issued in 2020
Policy F	UL with secondary guarantee issued in 2020
Policy G	Level death benefit whole life issued in 2020
Policy H	Whole life with increasing death benefit issued in 2020

- (a) (2 points) Assign each of the given 8 policies into the minimum number of groupings required under ASU 2018-12. Justify your answers.

ANSWER:



## 9. Continued

(b) (4 points) You are given the following for policy C:

$1000\bar{A}_{x:\overline{1} } =$	1.21
$1000\bar{A}_x =$	353.57
$1000\bar{A}_{x+1} =$	365.14
$1000\bar{A}_{x+5} =$	412.33
$1000\bar{A}_{x+6} =$	424.62

$\ddot{a}_x =$	19.29
$\ddot{a}_{x:\overline{10} } =$	8.52
$\ddot{a}_{x:\overline{20} } =$	14.20
$\ddot{a}_{x+1:\overline{9} } =$	7.79
$\ddot{a}_{x+1:\overline{19} } =$	13.67
$\ddot{a}_{x+5:\overline{5} } =$	4.64
$\ddot{a}_{x+5:\overline{15} } =$	11.46
$\ddot{a}_{x+6:\overline{4} } =$	3.78
$\ddot{a}_{x+6:\overline{14} } =$	10.87

Assume Policy C was issued on July 1 with death benefit of 250,000, its level premiums are paid annually, and there is no premium deficiency.

Calculate the semi-continuous CRVM mean reserve as of 12/31/2020. Show your work.

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

## 9. Continued

(c) (5 points) You are given the following for the policies subject to PBR:

Plan	Amounts in Millions				
	Accumulation UL	UL w Lifetime Secondary Guarantee	Agency Term	Direct Response Term	Whole Life
Asset Segment Backing Liabilities	Segment # 1	Segment # 2	Segment # 1	Segment # 2	Segment # 1
PV Premium	15	19	44	26	44
PV Expenses	3	6	14	6	12
PV Benefits	6	16	49	14	35
PV Commissions	0	2	3	0	6
PV Federal Income Taxes	8	3	4	3	10
Stochastic Reserve - CTE 70	2	8	3	1	5
Stochastic Reserve - CTE 90	4	11	5	2	7
Net Premium Reserve	6	7	17	3	11

Assume the company passes the stochastic exclusion test for applicable plans except for UL with lifetime secondary guarantee.

- (i) (3 points) Calculate the minimum PBR reserve permitted under the aggregation rules of VM-20.

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

- (ii) (2 points) Calculate the amount of reserve savings realized via aggregation.

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

# 10.

(11 points) With respect to VM-21 in the 2020 Valuation Manual:

(a) (6 points) You are given:

<b>Variable Annuity Balances as of the Valuation Date</b>	
Estimated Stat Reserve	125,000
Separate Account Assets	99,330
General Account Assets	65,550

<b>VM-21 model output: Scenario 1 of 1,000</b>						
<b>Year</b>	<b>Projection of Accumulated Deficiencies</b>			<b>Projections of the Additional Invested Assets Portfolio</b>		
	<b>Cash Surrender Value</b>	<b>Assets - Separate Account</b>	<b>Assets - General Account</b>	<b>Projection A</b>	<b>Projection B</b>	<b>Projection C</b>
0	141,900	99,330	25,670	38,400	39,150	40,350
1	147,650	105,080	22,739	39,641	40,391	41,591
2	140,151	98,106	24,444	40,711	41,461	42,661
3	137,774	96,442	25,827	41,749	42,499	43,699
4	139,388	98,056	29,194	42,771	43,521	44,721
5	113,125	79,187	25,229	43,785	44,535	45,735
6	83,094	58,166	29,161	44,794	45,544	46,744
7	78,224	54,757	25,806	45,801	46,551	47,751
8	54,345	38,041	16,078	46,806	47,556	48,756
9	46,256	32,379	9,847	47,811	48,561	49,761
10	39,162	27,413	4,463	48,815	49,565	50,765
11	35,676	24,973	945	49,821	50,571	51,771
12	29,339	20,537	(2,531)	50,827	51,577	52,777
13	23,229	16,260	(6,725)	51,834	52,584	53,784
14	18,323	12,826	(10,439)	52,842	53,592	54,792
15	14,030	9,821	(13,963)	53,852	54,602	55,802
16	10,924	7,647	(17,543)	54,863	55,613	56,813
17	7,918	5,543	(21,111)	55,876	56,626	57,826
18	7,221	5,055	(23,458)	56,890	57,640	58,840
19	5,762	4,033	(26,413)	57,906	58,656	59,856
20	4,390	3,073	(29,604)	58,923	59,673	60,873
21	3,307	2,315	(33,176)	59,943	60,693	61,893
22	2,563	1,794	(36,368)	60,963	61,713	62,913
23	2,217	1,552	(39,427)	61,986	62,736	63,936
24	1,862	1,303	(42,255)	63,010	63,760	64,960
25	-	-	(47,411)	64,036	64,786	65,986
26	-	-	(52,523)	65,063	65,813	67,013
27	-	-	(58,021)	66,093	66,843	68,043
28	-	-	(62,027)	67,124	67,874	69,074
29	-	-	(65,420)	68,156	68,906	70,106
30	-	-	(69,936)	69,190	69,940	71,140

## 10. Continued

- (i) (2 points) Assess which of the additional invested asset projections is most appropriate to use in the net asset earned rate (NAER) method. Justify your response.

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

- (ii) (3 points) Calculate the scenario reserve using the NAER method

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

- (iii) (1 point) Describe the changes to the projection that would result if the Direct Iteration method were used instead of the NAER method.

ANSWER:

## 10. Continued

- (b) (5 points) LZT Life has a large VA block with significant GMWB exposure and is in the process of formally documenting their hedging program as a Clearly Defined Hedging Strategy (CDHS).

You are given:

- LZT employs a dynamic delta, vega, and rho Greek matching strategy to hedge the fair value of their GMWB liability.
- LZT only hedges market risks and not decrement risks.
- LZT uses the CTE with Prescribed Assumptions (CTEPA) method to calculate the VM-21 additional standard projection amount, and their hedging strategy meets the requirements of a CDHS. Assume the block of business is homogeneous.
- LZT is planning to document its CDHS for VM-21 using the same requirements as VM-20.
- LZT does not use the Alternative Methodology for any contracts.

		Best Efforts	Adjusted	Adjusted with Prescribed Assumptions
With Cash Surrender Value Floor	CTE65	1,700	1,760	1,840
	CTE70	1,710	1,770	1,860
Without Cash Surrender Value Floor	CTE65	1,660	1,740	1,840
	CTE70	1,680	1,770	1,860

E-Factor	30%
Pretax Interest Maintenance Reserve	100
Cash Surrender Value	1,675

## 10. Continued

- (i) (1 point) List four additional items beyond those given that LZT must identify and document for their hedging strategy to meet the requirements of a CDHS.

ANSWER:

- (ii) (3 points) Calculate the VM-21 reserve.

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

- (iii) (1 point) Describe one requirement of the Company-Specific Market Path (CSMP) method that might increase the model's computation time relative to the CTEPA method, and one requirement that might decrease the computation time.

ANSWER:

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