

Exam RETRPIRM

Date: Friday, May 2, 2025

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 6 questions numbered 1 through 6 with a total of 40 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 file as directed. Graders will only look at work in the indicated file.

a) In the Word document, answers should be entered in the box marked ANSWER. 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 ^ used to indicate a superscript).

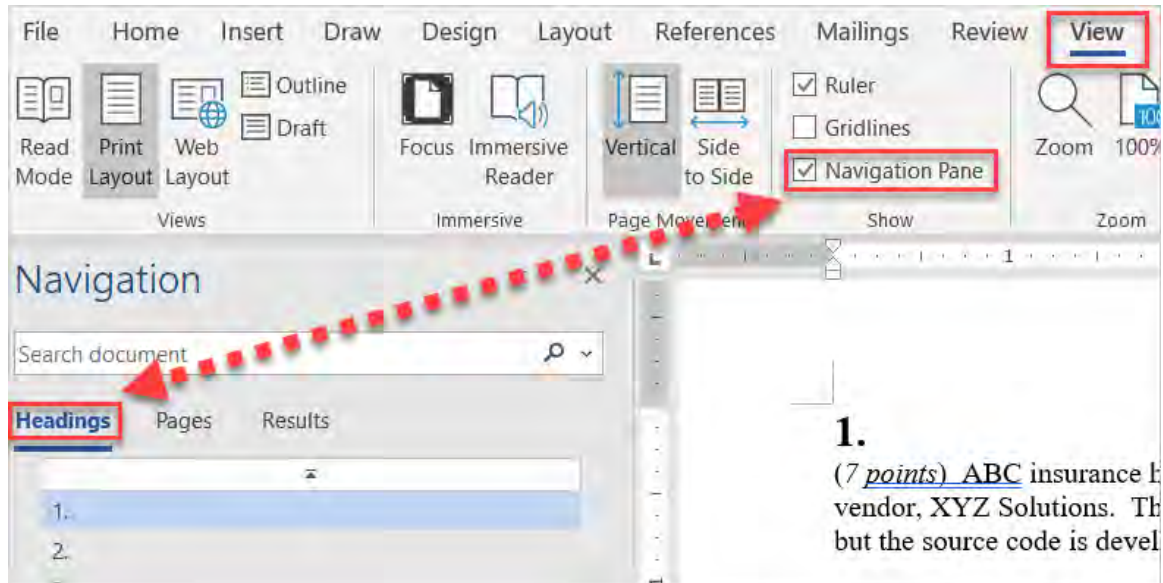
b) In the Excel document formulas should be entered. Performing calculations on scratch paper or with a calculator and then entering the answer in the cell will not earn full credit. Formatting of cells or rounding is not required for credit.

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 files that contain your answers must be uploaded before time expires.

Navigation Instructions

Open the Navigation Pane to jump to questions.

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



1.

(9 points) Company ABC is the plan sponsor of a defined benefit pension plan and is reviewing its investment strategy.

You are given:

Plan Liabilities	Value	Key Rate Durations		
		Short-term D1	Medium-term D2	Long-term D3
Active Participants	\$10,000,000	2	6	12
Vested Terminated Participants	\$5,000,000	0	8	4
Retired Participants	\$7,000,000	7	2	0

Asset Portfolio	Value	Key Rate Durations		
		Short-term D1	Medium-term D2	Long-term D3
Equities	\$12,000,000	0	0	0
Short-term Bonds	\$3,000,000	5	0	0
15-year Zero Coupon Bonds	\$5,000,000	0	15	0
Long-term Bond Fund	\$7,000,000	0	4	22

- (a) (1 point) Describe why Company ABC should consider asset/liability management as opposed to asset-only management.

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

1. Continued

- (b) (2 points) Calculate the key rate durations and the total effective duration for the plan liabilities.

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

- (c) (2 points) Calculate the key rate durations and the total effective duration of the asset portfolio.

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

- (d) (2 points) Calculate the dollar change in liabilities and assets if all of the following were to occur simultaneously:

- Short-term rates remain constant
- Medium-term rates increase by 40 basis points
- Long-term rates increase by 90 basis points

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

- (e) (2 points) Calculate the dollar change in liabilities and assets for an upward parallel shift in the yield curve of 65 basis points.

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

2.

(7 points)

- (a) (2 points) Explain why investing in illiquid alternatives over the long term is expected to outperform investing in publicly traded asset classes.

ANSWER:

- (b) (2 points) Explain why private market investment performance may be negative for the first few years after initially investing in the asset class.

ANSWER:

ABC Company sponsors a defined benefit pension plan.

You are given the following:

Assets	\$500 million
Liabilities	\$600 million
Plan Status	Open to new entrants

The CFO has proposed the following new asset allocation:

Asset Class	Minimum Allocation	Target Allocation	Maximum Allocation	Number of Managers
Public Equity	55%	65%	75%	5
Fixed Income	15%	20%	25%	3
Private Equity	13%	15%	17%	1

2. Continued

The CFO has made the following two statements about the new allocation to private market alternative investments.

- I. It is appropriate to have one investment manager for ABC Company's private equity investments given its smaller allocation.
- II. ABC Company needs a narrow range of allowable allocation around the target to private market alternative asset classes.

(c) (3 points) Critique each of the CFO's statements.

ANSWER:

3.

(6 points)

(a) (3 points) Compare and contrast the following types of longevity contracts:

(i) Indemnity-based longevity contracts

(ii) Index-based longevity contracts

ANSWER:

(b) (3 points) Describe four risks that should be considered before entering into an index-based longevity contract.

ANSWER:

4.

(5 points) Company ABC is considering adding target date funds to its defined contribution plan.

(a) (2 points) Describe the following risks faced by defined contribution plan members who invest in target date funds:

- (i) Growth risk
- (ii) Market risk
- (iii) Inflation risk
- (iv) Longevity risk

ANSWER:

(b) (1 point) List four tools not used in traditional target date funds that can be used to mitigate market risk.

ANSWER:

(c) (2 points) Explain how the four tools listed in (b) mitigate market risk.

ANSWER:

5.

(6 points)

- (a) (1 point) List the key factors that create pension arbitrage from a financial economics asset allocation perspective.

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

Company ABC sponsors a defined benefit pension plan. You are given:

	Pension Plan
	Target Asset Mix
Equities	60%
Bonds	40%

Individual Investor				
	Desired Personal Target Mix	Personal Tax Rate	Gross Personal Holdings	Gross Pension Holdings
Equities	40%	25%		
Bonds	60%	50%		
Total	100%		\$10,000.00	\$2,000.00

The corporate tax rate is 35%.

	Returns
Equities	8.0%
Bonds	6.0%

- (b) (4 points) Using the above and taking a financial economics viewpoint, calculate:
- (i) the current portfolio after-tax income for an individual investor; and
 - (ii) the optimal portfolio after-tax income for an individual investor.

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

5. Continued

- (c) *(1 point)* Explain how the arbitrage opportunity would be maximized by adjusting the level of corporate tax rates.

<i>The response for this part is to be provided in the Excel spreadsheet.</i>

6.

(7 points) You are given the following excerpt from the Investment Policy Statement (IPS) for the XYZ Company Retirement Plan:

Plan Type	Defined benefit pension plan
Plan Status	Open to new entrants
Sponsor Objectives	Invest pension fund assets taking into account ESG factors and maximize investment return
Composition of liability	Active – 40% of liability Retired – 60% of liability
Investment Manager	Different managers for each asset class
Performance Measurement	Measured in aggregate for the whole portfolio
Performance Monitoring	Annually
Rebalancing	Rebalanced to target monthly

The plan's asset allocation is as follows:

Asset class	Target	Minimum exposure	Maximum exposure
Bond Funds with an ESG Emphasis	40%	20%	60%
Global Equity Funds	25%	15%	40%
Global Direct Infrastructure	20%	10%	20%
Energy Funds	7%	5%	15%
Emerging Market Funds	5%	3%	8%
Cash	3%	0%	5%

- (a) (4 points) Critique the excerpt of the IPS.

ANSWER:

6. Continued

- (b) (3 points) Recommend changes to the excerpt of the IPS. Justify your recommendations.

ANSWER:

****END OF EXAMINATION****