SOCIETY OF ACTUARIES®

Retirement Plan Investment & Risk Management Exam

Exam RETRPIRM

Date: Friday, November 1, 2024

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.

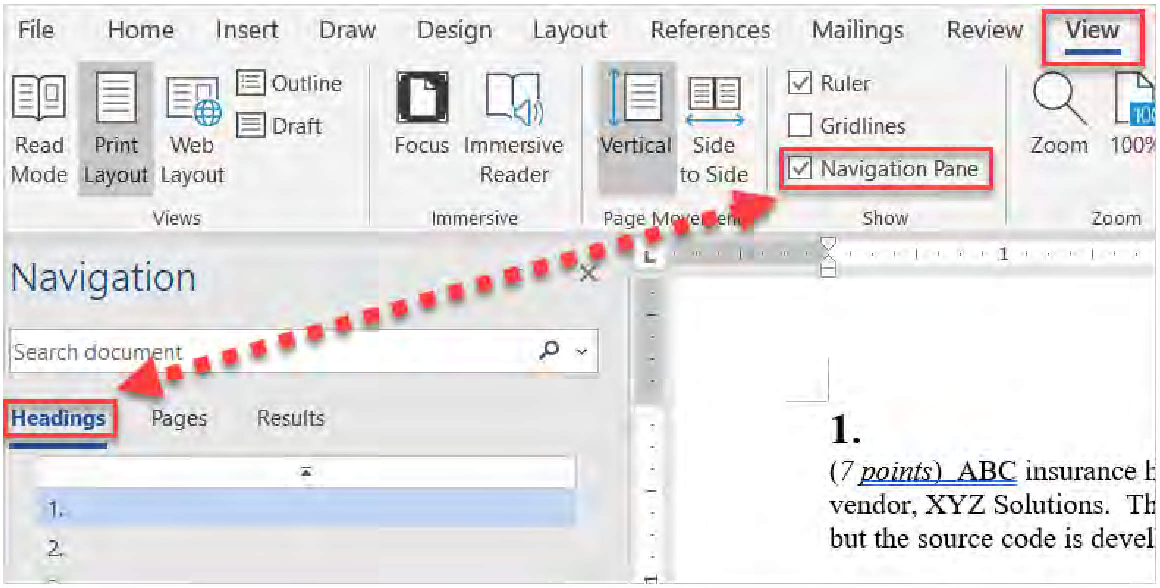
3. Prior to uploading your Word and Excel files, each file should be saved and renamed with your unique candidate number in the filename.

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.

(*6 points*)

(a) (*2 points*) Compare and contrast the following pension risk transfer solutions

(i) Annuity buy-in

(ii) Annuity buy-out

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

You are given the following mid-year cash flows for Company XYZ's frozen defined benefit pension plan:

[Cash flows are provided in Excel]

Company XYZ is considering completing an annuity buy-out for all the existing retirees in the plan.

You are given the following yield curve information as of the annuity purchase date:

[Yield curve is provided in Excel]

(b) (*2 points*) Calculate the plan's effective duration.

(i) before the buy-out transaction; and

(ii) after the buy-out transaction

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

As the plan is preparing to complete the annuity buy-out, the yield curve experiences a parallel shift of 100 basis points down.

(c) (*2 points*) Using the duration measures calculated in part (b), calculate the liability.

(i) before the buy-out transaction; and

(ii) after the buy-out transaction.

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

2.

(*7 points*) Company ABC sponsors a defined benefit pension plan. The company is considering the following three investment portfolios:

	Portfolio A	Portfolio B	Portfolio C
Target Fixed Income Allocation	70%	55%	40%
Target Public Equity Allocation	30%	45%	60%
Target Duration of Fixed Income Allocation	15.0	11.0	15.0
Minimum Credit Quality	BBB-	AA	No minimum

You are given:

- The liabilities have a duration of 12.0
- The liabilities are measured using a yield curve constructed with AA-rated bonds

Company ABC's investment objective is to maximize the overall asset return. However, they have interest rate risk and credit risk concerns.

Compare and contrast the three portfolios taking into consideration Company ABC's investment objective and concerns.

ANSWER:

3.

(*8 points*) XYZ Company is a publicly traded company that sponsors a defined benefit pension plan.

You are given:

Total Corporate Assets ($ millions)	$6,000
Total Corporate Debt ($ millions)	$3,500
Shareholder Equity ($ millions)	$2,500
Long-term Corporate Debt ($ millions)	$1,000
CAPM Beta for XYZ Stock	1.50
Pension Benefit Obligation (PBO) ($ millions)	$2,000
Pension Liability Adjusted for Holistic Balance Sheet ($ millions)	$2,250
Pension Assets ($ millions)	$1,500
Asset Allocation	60% in equities; 40% in bonds
Risk-free Rate of Return	3.00%
Market Return	7.00%

Note that the Net Pension Obligation is included in the Total Corporate Debt.

(a) (*2 points*) Describe four adjustments that can be made to the PBO to account for the pension liability under a holistic balance sheet approach.

ANSWER:

(b) (*1 point*) Describe the shortcomings of including the Net Pension Obligation instead of separating the pension asset and pension liability in the corporate balance sheet.

ANSWER:

3. **Continued**

(c) (*2 points*) Calculate the Weight Adjusted Cost of Capital (WACC) using:

(i) the accounting balance sheet; and

(ii) the holistic balance sheet

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

(d) (*2 points*) Explain how the long-term debt-to-equity ratio would be impacted if the pension liability were perfectly hedged, using the holistic balance sheet.

ANSWER:

The following year, Company XYZ's financial situation changes as noted in the following table:

Shareholder Equity ($ millions)	$2,200
CAPM beta for XYZ stock	1.50
Pension Assets ($ millions)	$1,800
Pension funded ratio	100%

(e) (*1 point*) Calculate how much equity capital is needed by XYZ Company to maintain the same equity beta if the plan no longer invests in equities.

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

4.
(*6 points*)

(a) (*3 points*) Describe the risks associated with investing in fixed income securities.

ANSWER:

Company XYZ sponsors a defined benefit pension plan.

You are given:

Plan Type	Open to new entrants Final salary benefit formula
Funded Status	68%
Current Asset Mix	40% Equities 60% Fixed income

The CFO of Company XYZ anticipates a fall in interest rates and proposes an asset mix of 100% in fixed income securities. The CFO asserts that the proposed asset mix would guarantee a lower and more stable level of employer contributions compared to the current asset mix.

(b) (*3 points*) Critique the CFO's assertion.

ANSWER:

5.

(*5 points*)

(a) (*2 points*) Describe four potential benefits of implementing counter-cyclical funding rules in pension plan regulations.

ANSWER:

(b) (*2 points*) Describe four potential challenges of implementing counter-cyclical funding rules in pension plan regulations.

ANSWER:

(c) (*1 point*) Explain how the use of asset smoothing and actuarial assumption smoothing can benefit defined benefit pension plans in the context of counter-cyclical funding rules.

ANSWER:

6.

(*8 points*) XYZ Company sponsors a defined benefit pension plan.

The plan characteristics are as follows:

- The plan is closed to new entrants
- Members continue to accrue benefits in the plan
- The duration of the plan's liability is 14
- The plan is 110% funded

The liability breakdown of the plan is as follows:

Active Members	40%
Former Members	10%
Retirees and Beneficiaries	50%

XYZ Company does not currently have a written investment policy and an internal committee manages the investments. You are given the following information about the current portfolio:

Duration	0
Current Allocation	Cash: 5% Individual stocks: Stock A: 57% Stock B: 20% Stock C: 18%

(a) (*3 points*) Critique XYZ's current investment practices.

ANSWER:

6. Continued

XYZ Company hired ABC Investing to recommend a new investment strategy and prepare an investment policy statement. You are given the following excerpt from the investment policy proposed by ABC Investing:

Investment Manager	ABC Investing
Investment Return Objective	8% per year
Risk Tolerance	The determination of the risk tolerance is delegated to ABC Investing
Investment Performance Monitoring	ABC Investing must provide quantitative and qualitative reporting to XYZ Company once a year
Duration of the fixed income investments	13.8
Corporate Bond Minimum Credit Quality	No more than 50% can be less than BBB rated
Target Allocation	Cash: 5% Long-term government bond fund: 20% Long-term corporate bond fund: 20% Large Cap Index fund: 40% Small Cap Index fund: 15%
Target Allocation Permitted Deviation	10%

(b) (*3 points*) Critique the above excerpt from the proposed investment policy statement considering CAPSA Guideline No. 6 and XYZ Company's fiduciary duties.

ANSWER:

(c) (*2 points*) Recommend changes to the proposed strategy. Justify your recommendations.

ANSWER:

****END OF EXAMINATION****