SOCIETY OF ACTUARIES

**Actuarial Topics for Canadian Retirement Plans**

# Exam RET 301

**Date:** Thursday, November 20, 2025

## 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 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, $\beta_1$ 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. To maintain anonymity, please refrain from using your name and use your candidate number instead.

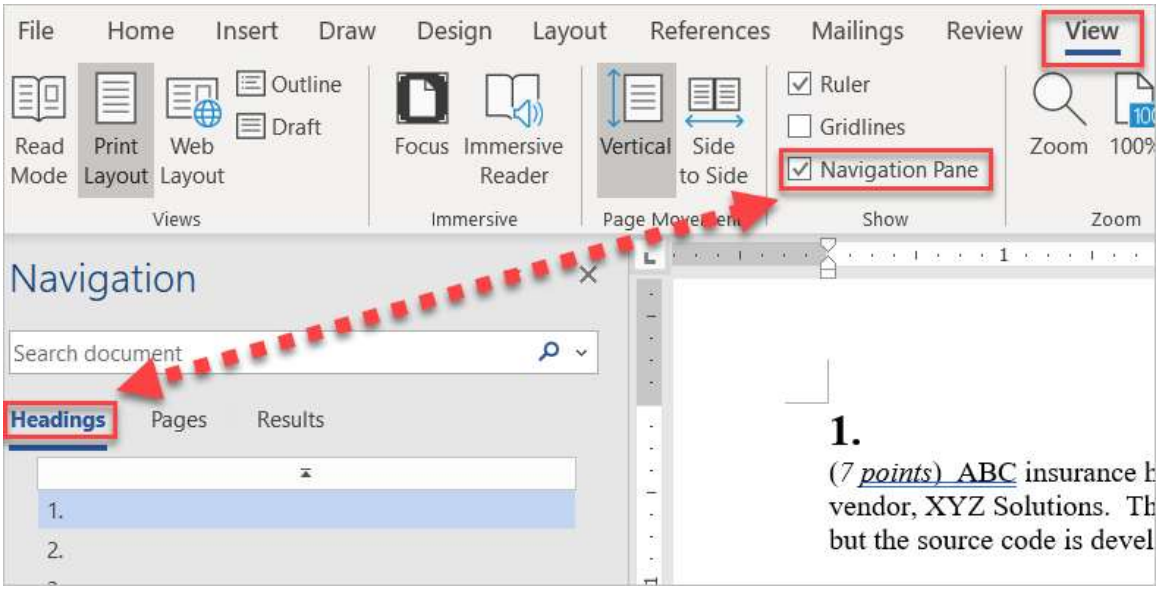
4. The Word and Excel files that contain your answers must be uploaded before the five-minute upload period expires.


8770 W. Bryn Mawr Avenue Suite 1000
Chicago, IL 60631

**Navigation Instructions**

Open the Navigation Pane to jump to questions.

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



## GENERAL INSTRUCTIONS

- All questions indicate whether the response is to be answered in Word or Excel. Only the Word document will be graded for parts of a question with Word answer boxes; only the Excel spreadsheet will be graded for parts of a question with Excel instructions.
- When answering in Excel, “show your work” means
    - Calculation formulas must be used in the answer cells containing the work.
    - All work should be labeled.

# 1.

(*7 points*) You are the actuary for a defined benefit pension plan. You are setting the mortality assumptions for the solvency valuations as at January 1, 2026.

(a) (*2 points*) Describe considerations when selecting a base mortality table in accordance with the Canadian Institute of Actuaries ("CIA") Educational Note on Assumptions for Hypothetical Wind-up and Solvency Valuations for liabilities that are assumed to be settled by:

(i) Commuted value

(ii) Annuity purchase

| ANSWER: |
|---|

(b) (*2 points*) Describe the considerations when selecting a mortality improvement scale in accordance with CIA guidance.

| ANSWER: |
|---|

You are given the following:

- The pension plan sponsor is a mining company.
- The plan covers mine workers.
- The most recent experience study based on data from 2010 to 2020 showed 15% higher-than-expected mortality rates for ages 75–85.
- There have not been significant mortality gains or losses in recent actuarial valuations for this plan.

(c) (*1 point*) Assess the appropriateness of using the 2014 CPM mortality table ("CPM2014") as the base table for this plan's solvency mortality rates.

| ANSWER: |
|---|

(d) (*2 point*s) Assess the appropriateness of using mortality improvement scale MI-2017 for this plan's going concern valuation, taking into consideration CIA guidance including the 2024 Educational Note Supplement on Mortality Improvements Research.

| ANSWER: |
|---|

# 2.

(*8 points*) Your client sponsors a non-contributory defined benefit pension plan registered in Ontario. As of the prior valuation, there are no required special payments.

You are given:

**Plan provisions:**

- The pension plan provides cost of living adjustment of 100% of CPI.
- The pension plan is open to new members

**Actuarial assumptions at December 31, 2024:**

Going concern assumptions:

| | |
|---|---|
| Discount rate: | 6.00% |
| Inflation: | 2.00% |
| Explicit allowance for administrative expenses: | $75,000 |
| Assets: | Market value of assets |

Information for the calculation of Provision for Adverse Deviation:

| | |
|---|---|
| Open plan | 4.00% |
| Asset allocation component (non-fixed income is 55%) | 3.50% |
| Benchmark discount rate (BDR) | 7.00% |

Solvency and Hypothetical Wind-up assumptions:

| | |
|---|---|
| Basis for benefits assumed to be settled through a lump sum | |
| - Non indexed rates | 3.90% for 10 years 4.50% thereafter |
| - 100% indexed rates | 2.10% for 10 years 2.60% thereafter |
| Basis for benefits assumed to be settled through the purchase of an annuity | |
| - Non indexed rate | 4.72% |
| - 100% indexed rate | 1.51% |
| Termination expenses: | $200,000 |

## 2. Continued

**Asset and liability information at December 31, 2024:**

| | |
|---|---|
| Market value of assets: | $28,750,000 |
| Going concern liability for active members: | $18,500,000 |
| Going concern liability for pensioners: | $10,000,000 |
| Going concern liability on a non-indexed basis for active members: | $15,725,000 |
| Going concern liability on a non-indexed basis for pensioners: | $8,500,000 |
| Normal cost: | $350,000 |
| Normal cost on a non-indexed basis: | $300,000 |
| Solvency transfer value liability: | $12,000,000 |
| Solvency annuity purchase liability for active members: | $10,000,000 |
| Solvency annuity purchase liability for pensioners: | $9,725,000 |
| Hypothetical wind-up transfer value liability: | $15,000,000 |
| Hypothetical wind-up annuity purchase liability for active members: | $11,000,000 |
| Hypothetical wind-up annuity purchase liability for pensioners: | $13,650,000 |

(a) (*3 points*) Calculate the minimum required and maximum permissible employer contributions for 2025 and the amortization payment schedule.

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

You are given:

**Asset information:**

| | |
|---|---|
| Market value of assets as at December 31, 2025 | $33,750,000 |
| Benefits paid during 2025 | $200,000 |

**Assumptions and liability information:**

| | |
|---|---|
| Solvency incremental cost for 2025 | $550,000 |
| Assumptions | No change from the prior valuation |
| 2025 actual cost of living adjustment provided | 2.00% |

(b) (*2 points*) Calculate the extrapolated going concern and solvency funded positions as at December 31, 2025.

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

## 2. Continued

Your client has informed you that they have approved a benefit improvement for all active members in the plan. The benefit improvement is effective as of December 31, 2025.

You are given:

**Increase due to benefit improvement as at December 31, 2025:**

| | |
|---|---|
| Going concern liability | $2,028,000 |
| Going concern liability on a non-indexed basis | $1,722,000 |
| Going concern normal cost | $50,000 |
| Solvency liability | $2,258,000 |
| Hypothetical wind-up liability | $2,822,000 |

(c) (*3 points*) Calculate the minimum required employer contributions for 2026 and the amortization payment schedule. Show all work.

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

# 3.

(*7 points*) The actuary of XYZ pension plan prepared the plan's funding valuation as at December 31, 2025.

You are given the following excerpt from the XYZ pension plan funding valuation report:

| ($000's) | Going concern results | Plausible adverse scenarios results | | |
|---|---|---|---|---|
| | | (i) | (ii) | (iii) |
| Market value of assets | $75 | $75 | $78 | $68 |
| Liabilities | $85 | $93 | $95 | $85 |
| Funded status | ($10) | ($18) | ($17) | ($17) |
| Total service cost | $12 | $13 | $14 | $12 |
| Life expectancy (in years) for a retiree age 65 | 20 | 22 | 20 | 20 |

The plausible adverse scenarios are determined in accordance with the Canadian Institute of Actuaries Standards of Practice.

(a) (*3 points*) Identify the risk that is assessed in each of the plausible adverse scenarios as outlined in the above table. Justify your answer.

ANSWER:

(b) (*2 points*) Describe the additional plausible adverse scenario disclosure requirements assuming that the XYZ pension plan is a defined benefit pension plan where contributions are fixed.

ANSWER:

(c) (*1 point*) Describe the conditions under which an adverse scenario would be characterized as a plausible adverse scenario.

ANSWER:

(d) (*1 point*) Describe two situations where the disclosure of plausible adverse scenarios is not required to be included in an external user report.

ANSWER:

# 4.

(*8 points*) Company XYZ would like to establish a Supplemental Executive Retirement Plan ("SERP").

(a) (*3 points*) Describe the considerations in establishing a SERP with respect to the following:

(i) Eligibility and benefit level

(ii) Governance

| ANSWER: |
| --- |

(b) (*5 points*) Compare and contrast the following approaches to securing SERP benefits.

(i) Pay-as-you-go

(ii) Funded Retirement Compensation Arrangements

(iii) Letter of Credit

(iv) Terminal Funding

| ANSWER: |
| --- |

# 5.

(*7 points*) Under Ontario's pension regulations, asset transfers can occur in two scenarios:

(i) Due to the sale of a business unit; or

(ii) The transfer of benefits between pension plans of the same employer.

(a) (*2 points*) For each of the two asset transfer scenarios, describe the following regulatory requirements:

(i) Effective date of the asset transfer

(ii) Solvency ratio requirements

| ANSWER: |
|---|

Your client sponsors two Ontario-registered defined benefit pension plans, the Salaried Plan and the Hourly Plan. These two plans will be merged and the Salaried Plan will become the successor plan. The Hourly Plan assets will be transferred to the Salaried Plan effective October 1, 2025.

**Asset transfer information as at October 1, 2025**

| **($ millions)** | **Hourly Plan** | **Salaried Plan** |
|---|---|---|
| Assets | 200 | 380 |
| Active solvency liabilities | 150 | 150 |
| Inactive solvency liabilities | 100 | 250 |

(b) (*2 points*) Calculate the amount of additional company contributions required as a result of the merger. Show all work.

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

(c) (*3 points*) Describe the notice requirements involved in completing the asset transfer.

| ANSWER: |
|---|

# 6.

(*6 points*) You are the actuary for a single employer defined benefit pension plan registered in Ontario.

You are given the following information as at December 31, 2024:

| | |
|---|---|
| Going concern discount rate (net of investment expenses; gross of administrative expenses) | 5.25% |
| Provision for adverse deviations ("PfAD") | 9.50% |
| Solvency blended discount rate | 4.63% |
| Provision for wind-up expenses | $450,000 |
| Market value of assets | $32,500,000 |
| Going concern liabilities (excluding PfAD) | $24,300,000 |
| Solvency liabilities | $26,600,000 |
| 2025 going concern annual total current service cost (excluding PfAD) | $800,000 |
| 2026 going concern annual total current service cost (excluding PfAD) | $815,000 |
| Annual provision for administrative expenses | $100,000 |
| 2025 solvency incremental cost | $875,000 |
| Going concern annual special payments payable in 2025 from prior valuation | $0 |
| Solvency annual special payment payable in 2025 from prior valuation | $0 |
| 2025 employee required contributions | $160,000 |
| 2026 employee required contributions | $166,000 |

You are provided the following asset information:

| | |
|---|---|
| Market value of assets at January 1, 2026 | $31,500,000 |
| 2025 benefit payments | $675,000 |
| 2025 employee contributions | $160,000 |
| 2025 employer contributions | $0 |

## 6. Continued

Additional asset information:

- The Pension Benefits Guarantee Fund ("PBGF") assessment fee payable in 2025 was paid directly by the employer.
- There are no liability gains or losses during 2025.
- For purposes of determining the January 1, 2026 going concern and solvency liabilities, assume the extrapolated liabilities are loaded by 5% as per the Financial Services Regulatory Authority ("FSRA") guidance for preparing cost certificates.
- All assumptions remain the same as at December 31, 2024 and the PfAD remains at 9.50%

You are asked to prepare a January 1, 2026 Cost Certificate.

(a) (*3 points*) Calculate the Available Actuarial Surplus for 2026. Show all work.

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

(b) (*3 points*) Calculate the 2026 minimum required and maximum permissible employer contributions. Show all work.

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

# 7.

(*7 points*) You are the actuary for Company ABC. Company ABC sponsors the Pension Plan for Executive Employees, a non-indexed defined benefit pension plan registered in Ontario. You are performing a valuation as at January 1, 2025.

You are given the following information as at January 1, 2025:

- 100% of solvency liabilities are assumed to be settled by an annuity purchase.
- Hypothetical wind-up liabilities are equal to the solvency liabilities.

**Liabilities:**

| | | |
|---|---|---|
| Annuity purchase discount rates | 4.92% | 4.93% |
| Solvency liabilities | $45,038,000 | $45,000,000 |

**CIA guidance on assumptions for hypothetical wind-up and solvency valuations at January 1, 2025**

| Annuity Duration | Duration | Unadjusted CANSIM V39062 | Spread relative to the V39062 |
|---|---|---|---|
| Low | 7.7 | 3.42% | + 160 bps |
| Medium | 9.7 | 3.42% | + 150 bps |
| High | 11.7 | 3.42% | + 150 bps |

(a) (*1 point*) Calculate the annuity purchase discount rate to be used for the solvency valuation.

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

Company ABC received an annuity quotation for the pension plan from Insurance Company Inc. for $47,950,000 with a quotation date of April 30, 2025.

(b) (*2 points*) Propose reasons why the annuity quotation differs from the annuity proxy.

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| ANSWER: |

## 7. Continued

(c) (*1 point*) Describe how you would reflect the annuity quotation in determining the solvency liabilities for the January 1, 2025 valuation.

| ANSWER: |
|---|

You are given:

- Solvency liabilities based on the annuity guidance is $44,100,000 as at January 1, 2025.

Your client has asked you not to reflect the quotation from Insurance Company Inc. in the preparation of the actuarial valuation report.

(d) (*3 points*) Describe the considerations in reflecting or not reflecting the annuity quotation under CAPSA guidance.

| ANSWER: |
|---|

****END OF EXAMINATION****