

Exam RETFRC

Funding & Regulation Exam - Canada

Date: Thursday, April 27, 2023

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 7 questions numbered 1 through 7 with a total of 80 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.

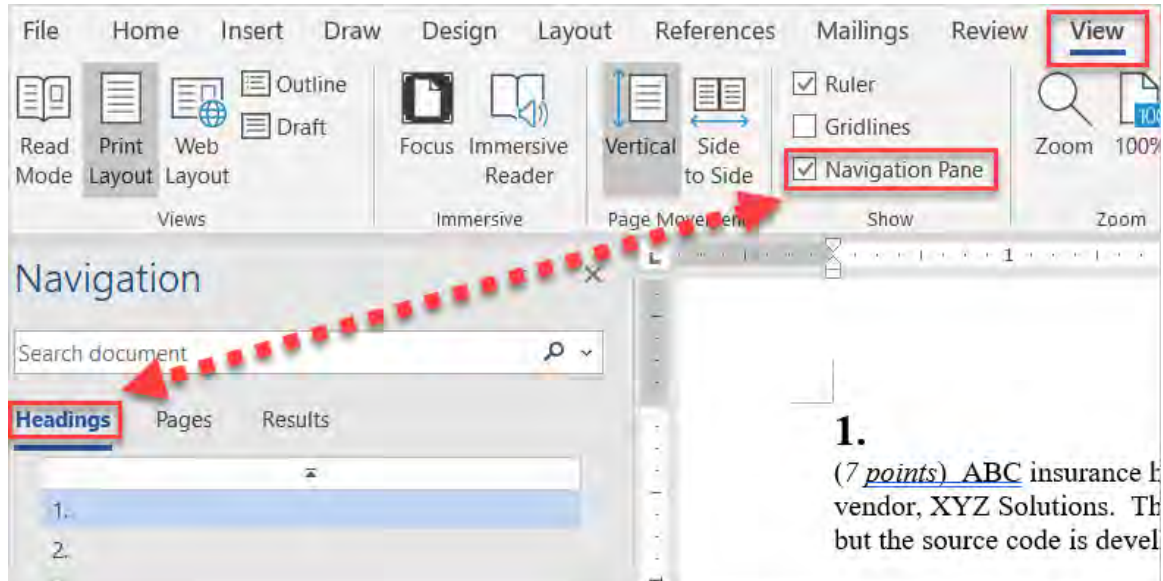
Written-Answer Instructions

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 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.

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

You are given:

Pension Plan Provisions

Employee contributions	7.5% of pensionable earnings up to 31 years of pensionable service, 0% after 31 years of pensionable service
Lifetime pension	2.0% of best average earnings times the minimum of years of pensionable service and 31 years
Bridge pension (payable from retirement to age 65)	Flat benefit of \$2,000 per month
Best average earnings	Average of the three consecutive years' pensionable earnings in the past five years that has the highest value
Normal retirement age	Age 65
Early retirement age	Age 55
Earliest unreduced retirement date	30 years of pensionable service
Early retirement reduction	6% per year from age 65 on lifetime and bridge pension

Year	YMPE	ITA maximum pension limit	Maximum monthly OAS pension	Maximum monthly CPP
2022	\$64,900	\$3,420.00	\$642.25	\$1,253.59
2021	\$61,600			
2020	\$58,700			
2019	\$57,400			
2018	\$55,900			
2017	\$55,300			

1. Continued

You are given the following information about two plan members who retired on December 31, 2022:

	Member A	Member B
Age at December 31, 2022	56	59
Pensionable service at December 31, 2022	9	31
Pensionable service at January 1, 2022	8	30.25
Pensionable earnings in 2022	\$300,000	\$100,000
Pensionable earnings in 2021	\$320,000	\$98,039
Pensionable earnings in 2020	\$313,725	\$96,117
Pensionable earnings in 2019	\$307,574	\$94,232
Pensionable earnings in 2018	\$301,543	\$92,385
Pensionable earnings in 2017	\$295,631	\$90,573
Immediate annuity factor at retirement	18.3	17.4
Deferred to 65 annuity factor at retirement	10.7	12.0

- (a) (4 points) Calculate the lifetime and bridge pensions payable to both members.

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

- (b) (1 point) Calculate the 2022 Pension Adjustments for both members.

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

- (c) (1 point) Calculate the 2022 employee contributions for Member A.

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

2.

(8 points) A small professional services firm sponsors a final average pay defined benefit pension (DB) plan for all employees.

The DB plan has been a differentiator for the firm in retaining employees in an industry where turnover is common, but they have seen a sharp increase in turnover in recent months.

Plan provisions

Normal retirement age	Age 65
Early retirement age	Age 55
Normal retirement benefit	2% final average earnings per year of service
Early retirement benefit	Accrued benefit reduced by 0.25% per month that early retirement precedes age 62 for actives, and actuarially reduced for members who terminate prior to retirement
Termination benefit	Actuarially equivalent lump sum of the accrued pension payable at age 65, or deferred pension payable at normal retirement age

Assumptions

Retirement assumption: 100% at age 62

Termination assumption: None prior to retirement

Historical plan experience

	1/1/2018	1/1/2019	1/1/2020	1/1/2021	1/1/2022
Retirement (gains)/losses	(\$2,200)	\$1,400	(\$10,200)	(\$6,700)	(\$7,100)
Termination (gains)/losses	(\$5,300)	(\$3,800)	(\$4,700)	(\$8,200)	(\$10,500)
Unfunded going concern liability	\$66,000	\$74,000	\$68,000	\$61,000	\$53,000

- (a) (3 points) Assess the appropriateness of the current retirement and termination assumptions.

ANSWER:

2. Continued

- (b) (5 points) Describe the considerations for changing the retirement and termination assumptions for the January 1, 2023 valuation.

ANSWER:

3.

(32 points) MNO Limited sponsors a non-contributory defined benefit pension plan registered in Ontario.

You are given:

Plan Provisions

Normal retirement age (NRA)	Age 65
Normal retirement benefit	1.8% of final 3-year average earnings (FAE3)
Normal form of payment	Life only, payable monthly in advance
Early retirement reduction	With 10+ years of service, benefit is reduced 3% per year from age 60. Otherwise, benefit is reduced 6% per year from NRA
Termination benefit	Monthly pension deferred to NRA. Deferred members can start their pension as early as age 55, but on an actuarially equivalent basis

For an actuarial valuation for funding purposes as at January 1, 2022, you are given:

Actuarial Assumptions and Method

Going Concern Assumptions

Discount rate	5.0%	(per year)
Provision for adverse deviation (PfAD)	10.0%	
Salary increase rate	3.0%	(per year)
Pre-retirement mortality	None	
Actuarial cost method	Projected unit credit, service prorate	
Retirement age	100% at age 60	
Termination rates	Age	Rate
	45	10%
	55	5%

3. Continued

Solvency Assumptions

Discount rate	2.5% (per year)
Pre-retirement mortality	None
Windup expense assumption	\$100,000
Retirement age	As per the Standards of Practice

Liability Information

ID	Status	Age	Going Concern Liability (\$)	Normal Cost (BOY) (\$)	Solvency Liability (\$)
1	Active	39	134,000	13,000	141,000
2	Active	42	421,000	22,000	608,000
3	Active	54	487,000	29,000	643,000
4	Deferred	50	76,000	0	148,000
5	Deferred	60	310,000	0	465,000
6	Retired	75	470,000	0	581,000

Asset Information

Market value of assets:	\$2,700,000
Fixed income allocation:	50%

For an actuarial valuation for funding purposes as at **January 1, 2023**, you are given:

Participant data as at January 1, 2023

ID	Status	Age	Accrued Monthly Benefit	Credited Service	Salary Current Year (CY)	Salary CY-1	Salary CY-2	Salary CY-3	Salary CY-4
1	Active	40	n/a	11.00	89,000	88,000	85,000	83,000	81,000
2	Active	43	n/a	20.00	150,000	137,000	133,000	129,000	125,000
3	Retired	55	n/a	18.00	n/a	122,000	118,000	115,000	112,000
4	Deferred	51	1,000	n/a	n/a	n/a	n/a	n/a	n/a
5	Retired	61	2,500	n/a	n/a	n/a	n/a	n/a	n/a
6	Retired	76	4,000	n/a	n/a	n/a	n/a	n/a	n/a

3. Continued

Assume that all membership movements occurred on December 31, 2022 and that the retired members elected a life only pension.

Actuarial Assumptions and Methods

Going concern discount rate	3.5%	(per year)
Provision for adverse deviation (PfAD)	7.0%	
Solvency discount rate	2.3%	(per year)

All other assumptions and methods are unchanged from the prior valuation.

Asset Information

Market value of assets	\$2,600,000
Fixed income allocation	80%

The minimum required contributions were made to the plan in 2022.

Annuity Factors:

[Provided in the Excel worksheet]

- (a) (2 points) Calculate the minimum required and maximum permissible employer contributions for 2022.

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

- (b) (9 points) Calculate the total normal cost, going concern liability, and the unfunded actuarial liability as at January 1, 2023.

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

- (c) (10 points) Calculate the gains and losses on a going concern basis by source for 2022, excluding PfAD.

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

- (d) (6 points) Calculate the solvency funded position as at January 1, 2023.

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

3. Continued

You have determined the projected solvency liabilities as at January 1, 2024, to be \$2,900,000.

- (e) (2 points) Calculate the 1-year solvency incremental cost for 2023.

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

- (f) (3 points) Calculate the minimum required and maximum permissible employer contributions for 2023.

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

4.

(8 points) You are the new actuary for Company ABC. You have been asked to review the following letter from the prior actuary that was sent to Company ABC.

“The purpose of this letter is to provide additional information regarding a potential benefit improvement to the ABC Pension Plan (the “Plan”) as at January 1, 2023.

Based on prior discussions, Company ABC would like to improve pension benefits from the Plan as follows:

- *Improve the unreduced early retirement age to age 55 (from 65) and increase the plan formula from 1.5% times pensionable earnings to 2% times pensionable earnings for executive plan members only.*

Results

The estimated increase in liabilities as of January 1, 2023, is \$3 million and the estimated increase in normal cost as of January 1, 2023 for the following year is \$100,000.

Actuarial Assumptions & Methods

As discussed, in order to help gain approval for the benefit improvement, we have adjusted the actuarial assumptions from the most recent actuarial valuation report to produce a lower cost.

Plan Provisions & Membership Data

These estimates are based on the plan provisions we have on file and the membership data we received from Company ABC after the completion of the most recent valuation report.

*Regards,
Actuary X, FCIA”*

- (a) (5 points) Describe areas of non-compliance with Canadian professional standards.

ANSWER:

- (b) (3 points) Recommend a course of action to address the non-compliance.

ANSWER:

5.

(8 points) Your client sponsors a non-contributory defined benefit pension plan.

You are given:

Plan Provisions

Retirement benefit	1.5% of final year's earnings times years of service
Normal form of payment	Life only, payable monthly in advance
Normal retirement age	Age 65
Early retirement age	Age 55
Early retirement reduction	3% per year from age 60 to age 65 6% per year from age 55 to age 60
Termination benefit	Deferred pension payable at Normal retirement age

Actuarial Assumptions and Methods

Discount rate	5.0% per year	
Salary increase rate	3.5% per year	
Retirement rates	Age	Rate
	60	50%
	65	100%
Termination rates	Service	Rate
	0-3	20%
	4-7	10%
	8-9	5%
	10+	0%
Other pre-retirement decrements	None	
Actuarial cost method	Aggregate	
Asset method	Market value of assets	

Annuity factors

$$\ddot{a}_{65}^{(12)} = 12.5 \quad \ddot{a}_{60}^{(12)} = 13.9$$

Participant Data as at December 31, 2022

	Member A	Member B
Age	29	50
Service	9	20
2022 salary	\$80,000	\$120,000

5. Continued

Financial Information

Market value of assets as at December 31, 2022: \$400,000

- (a) (4 points) Calculate the normal cost of the plan as at December 31, 2022.

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

You are given the following for 2023:

- Member B terminates employment on January 1, 2023, and remains eligible to receive a deferred pension at age 65 from the plan.
- Member A receives a salary increase of 10% on January 1, 2023.
- A contribution of \$50,000 is made to the plan on January 1, 2023.
- The plan's fund earns a rate of return of 15% during 2023.

- (b) (4 points) Calculate the accrued liability and normal cost for the plan as at December 31, 2023.

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

6.

(10 points) Describe how the Pension Benefits Act (Ontario) complies with Core Principle 5 from the OECD Core Principles of Private Pension Regulation with respect to the following:

- (i) Plan design;
- (ii) Member choice;
- (iii) Disclosure and availability of information; and
- (iv) Entitlement process and rights of redress.

ANSWER:

7.

(8 points) You are the actuary for a company that sponsors a defined benefit pension plan registered in Ontario.

You are given:

Government of Canada Bonds at December 31, 2022

	CANSIM Series	Yield
Marketable bonds with maturities over 10 years	V39062	2.86%
Real-return long-term bonds	V39057	0.86%

Inflation Expectations at December 31, 2022

Period	Bank of Canada Target for Inflation (per year)	Economist Consensus Inflation Expectations (per year)
Short-term (< 1 year)	1% - 3%	6% - 8%
Long Term	1% - 3%	2%

Statistics Canada released the following historical Canadian consumer price index (CPI) increase data:

Year	CPI increase
2019	2.4%
2020	1.0%
2021	5.7%
2022	6.2%

Describe the considerations for determining the following actuarial assumptions for a going concern valuation as at December 31, 2022.

- (i) Inflation;
- (ii) YMPE and Income Tax Act Maximum Defined Benefit Pension increases; and
- (iii) Salary Scale.

ANSWER:

****END OF EXAMINATION****