Exam 6C

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CASUALTY ACTUARIAL SOCIETY
AND THE
CANADIAN INSTITUTE OF ACTUARIES

Exam 6-Canada

Regulation and Financial Reporting (Nation Specific)

May 3, 2017

4 HOURS

INSTRUCTIONS TO CANDIDATES

1. This 69 point examination consists of 27 problem and essay questions.

2. For the problem and essay questions, the number of points for each full question and part of a question is indicated at the beginning of the question or part. Answer these questions on the lined sheets provided in your Examination Envelope. Use dark pencil or ink. Do not use multiple colors or correction fluid/tape.

   - Write your Candidate ID number and the examination number, 6C, at the top of each answer sheet. For your Candidate ID number, four boxes are provided corresponding to one box for each digit in your Candidate ID number. If your Candidate ID number is fewer than 4 digits, begin in the first box and do not include leading zeroes. Your name, or any other identifying mark, must not appear.
   - Do not answer more than one question on a single sheet of paper. Write only on the front lined side of the paper – **DO NOT WRITE ON THE BACK OF THE PAPER**. Be careful to give the number of the question you are answering on each sheet. If your response cannot be confined to one page, please use additional sheets of paper as necessary. Clearly mark the question number on each page of the response in addition to using a label such as "Page 1 of 2" on the first sheet of paper and then "Page 2 of 2" on the second sheet of paper.
   - The answer should be concise and confined to the question as posed. When a specified number of items are requested, do not offer more items than requested. For example, if you are requested to provide three items, only the first three responses will be graded.
   - In order to receive full credit or to maximize partial credit on mathematical and computational questions, you must clearly outline your approach in either verbal or mathematical form, showing calculations where necessary. Also, you must clearly specify any additional assumptions you have made to answer the question.

CONTINUE TO NEXT PAGE OF INSTRUCTIONS

3. Do all problems until you reach the last page of the examination where "END OF EXAMINATION" is marked.

   All questions should be answered according to the Canadian statutory accounting practices and principles, unless specifically instructed otherwise. SAP refers to Statutory Accounting Principles, and GAAP refers to Generally Accepted Accounting Principles.

4. Prior to the start of the exam you will have a **fifteen-minute reading period** in which you can silently read the questions and check the exam booklet for missing or defective pages. A chart indicating the point value for each question is attached to the back of the examination. Writing will NOT be permitted during this time and you will not be permitted to hold pens or pencils. You will also not be allowed to use calculators. The supervisor has additional exams for those candidates who have defective exam booklets.

5. Your Examination Envelope is pre-labeled with your Candidate ID number, name, exam number and test center. Do not remove this label. Keep a record of your Candidate ID number for future inquiries regarding this exam.

6. Candidates must remain in the examination center until two hours after the start of the examination. The examination starts after the reading period is complete. You may leave the examination room to use the restroom with permission from the supervisor. To avoid excessive noise during the end of the examination, candidates may not leave the exam room during the last fifteen minutes of the examination.

7. At the end of the examination, place all answer sheets in the Examination Envelope. Please insert your answer sheets in your envelope in question number order. Insert a numbered page for each question, even if you have not attempted to answer that question. Nothing written in the examination booklet will be graded. Only the answer sheets will be graded. Also place any included reference materials in the Examination Envelope. BEFORE YOU TURN THE EXAMINATION ENVELOPE IN TO THE SUPERVISOR, BE SURE TO SIGN IT IN THE SPACE PROVIDED ABOVE THE CUT-OUT WINDOW.

8. If you have brought a self-addressed, stamped envelope, you may put the examination booklet and scrap paper inside and submit it separately to the supervisor. It will be mailed to you. Do not put the self-addressed stamped envelope inside the Examination Envelope. Interoffice mail is not acceptable.

   If you do not have a self-addressed, stamped envelope, please place the examination booklet in the Examination Envelope and seal the envelope. You may not take it with you. Do not put scrap paper in the Examination Envelope. The supervisor will collect your scrap paper.

   Candidates may obtain a copy of the examination from the CAS Web Site.

   All extra answer sheets, scrap paper, etc. must be returned to the supervisor for disposal.

9. Candidates must not give or receive assistance of any kind during the examination. Any cheating, any attempt to cheat, assisting others to cheat, or participating therein, or other improper conduct will result in the Casualty Actuarial Society and the Canadian Institute of Actuaries disqualifying the candidate's paper, and such other disciplinary action as may be deemed appropriate within the guidelines of the CAS Policy on Examination Discipline.

10. The exam survey is available on the CAS Web Site in the "Admissions/Exams" section. Please submit your survey by May 17, 2017.

END OF INSTRUCTIONS

1. (2.75 points)

   a. (1 point)

      Identify four matters that are *intra vires* of the federal Parliament.

   b. (0.5 point)

      Briefly describe two areas that the federal legislation is concerned with regarding the financial soundness of an insurance company.

   c. (1.25 points)

      Identify whether each of the following is *intra vires* of provincial legislation.

      i. Reinstatement premium rate
      ii. Premium payment schedule
      iii. Brokerage fees
      iv. Rating methodology
      v. Claims handling process

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2. (2 points)

An insurance company is considering the use of credit information for personal automobile insurance.

a. (1 point)

Provide two arguments for and two arguments against the use of credit information.

b. (1 point)

Briefly describe four principles in gathering consent to collect and use credit information.

3. (1.5 points)

Fully explain whether or not each of the following statements is accurate.

a. (0.5 point)

Regulatory approval of premium rates under a File and Use system is faster than under a Prior Approval system.

b. (0.5 point)

Regulatory approval of premium rates under an Open Competition system is faster than under a Prior Approval system.

c. (0.5 point)

Regulatory approval of premium rates under a Use and File system is faster than under a File and Use system.

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4. (2.25 points)

In each of the following scenarios, an insurance company is defending its position in court. Explain a likely outcome for the insurance company and cite any relevant precedents used to support the conclusion drawn.

a. (0.75 point)

In Ontario, a personal automobile policyholder is injured in a motor vehicle accident as a result of the negligence of another driver. The policyholder obtains a settlement against the negligent driver which includes their total medical expenses. The policyholder then brings this action against their own motor vehicle insurer for the total amount of their medical expenses. The insurer objects to paying.

b. (0.75 point)

In Ontario, an insurer issues a policy protecting the insured's property against loss by fire, lightning, windstorm, theft, etc. The policy specifies proof of loss within 60 days after a loss. The insured's exposure is unrelated to marine adventure, even though the policy is headed "inland marine policy". Following a fire loss, the insured makes a claim as soon as practicable on the 70th day after the loss. The insurer denies the claim.

c. (0.75 point)

In Ontario, an insured A suffers serious injuries in a motor vehicle collision and brings an action against the driver of the other vehicle B, an underinsured motorist. Insured A subsequently enters into a limits agreement with B, without notice to A's insurer. The agreement provides that B will admit liability and A will not sue them in excess of their liability insurance coverage. A seeks to recover the remainder of the damages from their insurer. A's insurer argues that a limits agreement precludes A from advancing a claim against the insurer.

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5. (1.75 points)

The Supreme Court of Canada's decisions in *Andrews v. Grand & Toy Alberta Ltd.*, *Teno v. Arnold*, and *Thornton v. Prince George School District No.57* are commonly referred to as the 1978 Trilogy.

a. (0.5 point)

Describe the outcome of the 1978 Trilogy.

b. (1 point)

In the case of *Fenn v. City of Peterborough* in 1979, the Ontario Court of Appeal determined that the appropriate figure for general damages was $125,000. This decision was not appealed. Fully describe the likely outcome if the case were subsequently appealed to the Supreme Court of Canada.

c. (0.25 point)

In the case of *Lee v. Dawson*, the Supreme Court of Canada dismissed the plaintiff's application for Leave to Appeal. Briefly discuss the implication of the Supreme Court's refusal to revisit this issue.

CONTINUED ON NEXT PAGE

6. (2.5 points)

   a. (0.5 point)

      Describe the concept of joint and several liability.

   b. (0.5 point)

      Briefly describe two arguments in favour of joint and several liability.

   c. (0.25 point)

      Briefly describe one argument against joint and several liability.

   d. (0.25 point)

      Briefly describe the concept of proportionate liability.

   e. (0.5 point)

      Briefly describe two reforms to joint and several liability which may reduce settlement costs for the defendant.

   f. (0.25 point)

      Briefly describe the term “peripheral asbestos defendants”.

   g. (0.25 point)

      Briefly describe how peripheral asbestos defendants may be disadvantaged in a jurisdiction that applies joint and several liability.

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7. (3.5 points)

The Facility Association accomplishes its mission of ensuring automobile insurance availability through two types of risk sharing mechanism: risk sharing pools (RSP) and the Facility Association residual market (FARM).

a. (0.5 point)

Briefly describe the key purpose of each risk sharing mechanism: RSP and FARM.

b. (2 points)

Compare and contrast RSP and FARM with respect to:

i. Rates and rules
ii. Servicing carriers
iii. Policyholder awareness
iv. Treatment of losses in Ontario Private Passenger Automobile rate filing

c. (1 point)

Identify four classes of business that determine a member's participation in the Facility Association results.

CONTINUED ON NEXT PAGE

8. (2.25 points)

With respect to agricultural insurance in Canada:

a. (0.25 point)

Define probable yield.

b. (1 point)

Briefly describe four adjustments to historical probable yields to estimate the current probable yield.

c. (1 point)

Identify four stabilizing or mitigating techniques used in probable yield methodologies.

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9. (2.5 points)

The government-supported tier of Canada's income security system provides pensions through a combination of three programs.

a. (1.5 points)

Identify and briefly describe each of the three programs.

b. (0.5 point)

For any two of the programs, briefly describe how they are funded.

c. (0.5 point)

For any two of the programs, briefly describe how the benefits are taxed.

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10. (3 points)

The following information is provided about a community exposed to flood risk:

- There are 10,000 properties
- All properties are identical and valued at $500,000
- A flood event will cause 25% damage proportional to the property's value
- The market charges insurance premiums that are equal to expected losses
- The Flood Insurance Participation Rate is the percentage of property owners that purchase flood insurance

A government agency is evaluating three flood risk management options:

Risk Management Option	One-Time Cost of Infrastructure Improvements	Flood Loss Return Period (Years)	Flood Insurance Participation Rate
1. Not investing in additional infrastructure	$0	50	50%
2. Building a dike	$100,000,000	250	75%
3. Building a floodway	$150,000,000	500	100%

Evaluate, over a five-year horizon, which of the three options above the government agency should implement.

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11. (3.25 points)

You are given the following information for the Property reinsurance business of a company as at December 31, 2016. The company has no other business. All amounts are in thousands of dollars ($000s).

From Actuarial Valuation Report

Gross of Reinsurance

Cumulative Paid Claims

Year	12	24	36	48
2013	2,500	5,000	10,000	11,000
2014	3,700	5,500	9,000	
2015	2,800	6,000		
2016	3,000			

Ultimate Claims (Undiscounted)

Year	12	24	36	48
2013	10,000	12,000	11,500	11,500
2014	10,000	10,000	10,000	
2015	11,000	11,500		
2016	12,000			

Effect of Discounting and PFAD

Year	12	24	36	48
2013	113	206	36	18
2014	95	132	24	
2015	123	162		
2016	135			

Net of Reinsurance

Cumulative Paid Claims

Year	12	24	36	48
2013	1,250	2,500	5,000	5,500
2014	1,850	2,750	4,500	
2015	1,400	3,000		
2016	1,500			

Ultimate Claims (Undiscounted)

Year	12	24	36	48
2013	5,000	6,000	5,750	5,750
2014	5,000	5,000	5,000	
2015	5,500	5,750		
2016	6,000			

Effect of Discounting and PFAD

Year	12	24	36	48
2013	417	445	91	34
2014	350	286	61	
2015	456	349		
2016	500			

From Schedule 10.60

The investment yield for the year ended December 31, 2016 is 3%.

<< QUESTION 11 CONTINUED ON NEXT PAGE >>

From Schedule 60.30

Class of Insurance	Claims and Adjustment Expenses Paid – Current Year			
	Direct	Reinsurance Assumed	Reinsurance Ceded	Net
Property	A	B	C	D

Class of Insurance	Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses – Current Year			
	Direct	Reinsurance Assumed	Reinsurance Ceded	Net
Property	E	F	G	H

Class of Insurance	Margin or Deficiency for Unpaid Claims at Prior Year End				
	Net Provision for Prior Year-End	Net Amount Paid During the Year for Claims of Prior Years	Investment Income on Unpaid Claims of Prior Years	Net Provision for Claims of Prior Years	Margin (Deficiency)
Property	I	J	K	L	M

Calculate the amounts in A to M in the Schedule 60.30 above.

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12. (3.5 points)

The following information is available for a property and casualty insurance company as at December 31, 2016. All amounts are in thousands of dollars ($000s).

	Held-to-Maturity Bond Portfolio	Available-for-Sale Bond Portfolio	Fair Value Option Bond Portfolio
Cash flow from 2017	1,000.0	500.0	2,000.0
Cash flow from 2018	1,000.0	750.0	1,500.0
Cash flow from 2019	500.0	1,000.0	1,500.0
Market Value	2,291.3	2,020.3	4,561.1

Calendar year claims payout pattern

2017	40%
2018	35%
2019	25%

Other information:

- Effective market yield: 5%
- Undiscounted losses and adjustment expenses: 5,000
- Assume all asset and liability cash flows are made at the end of the year.
- The market value of each bond corresponds to the present value of cash flows discounted at the effective yield.
- MfAD for claims development: 8%
- MfAD investment return rates: 0.5%
- Assume that there are no income taxes.

A change in interest rates occurs on December 31, 2016 which causes the yield to decrease from 5% to 4%.

Calculate the impact of the rate decrease on the following:

i. Net Income
ii. Other Comprehensive Income
iii. Equity

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13. (3.25 points)

The following information is available from the December 31, 2016 P&C-1 of a property and casualty insurance company. All amounts are in thousands of dollars ($000s).

Balance Sheet

	Current Year	Prior Year
Cash	5,000	4,000
Bonds and Debentures	40,000	45,000
Common Shares	2,600	2,000
Real Estate	12,000	14,000
Agents and Brokers Receivables	500	750
Unearned Premiums Recoverable	10,000	12,000
Unpaid Claims and Adjustment Expenses Recoverable	?	?
Total Assets	105,000	101,000
Gross Unpaid Claims and Adjustment Expenses	40,000	38,000
Equity	30,000	28,000

Income Statement

	Current Year	Prior Year
Net Premiums Written	44,000	47,000
Decrease (Increase) in Net Unearned Premiums	1,200	1,000
Net Claims and Adjustment Expenses	35,000	32,000
Total Acquisition Expenses	5,000	5,000
General Expenses	3,000	3,200
Investment Income	6,000	4,000
Realized Gains (Losses)	(1,000)	500
Investment Expenses	500	400
Income Taxes – Total	2,500	2,800

Net Leverage Ratio at the end of the current year = 260%

All of the company's reinsurance is placed with an unregistered reinsurer without collateral.

<< QUESTION 13 CONTINUED ON NEXT PAGE >>

a. (1.75 points)

Calculate each of the following ratios as at December 31, 2016.

i. Investment Yield
ii. Return on Equity
iii. Return on Assets
iv. Net Underwriting Leverage Ratio

b. (1 point)

Based on the ratios calculated in part a. above, assess whether the company is in good financial health.

c. (0.5 point)

Calculate the unpaid claims and adjustment expenses recoverable at the end of the current year.

14. (1.75 points)

a. (1 point)

The following are two ways to fulfill the requirements regarding disclosure of sensitivity to insurance risk in a property and casualty insurance company's financial statements. Describe each method:

i. Quantitative
ii. Qualitative

b. (0.75 point)

Identify three examples of sensitivity tests that could be considered for insurance risk.

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15. (2.5 points)

The following information is available for a property and casualty insurance company as at December 31, 2016. The company writes only one line of business. All amounts in the tables below are in thousands of dollars ($000s).

	Gross	Net
Unearned Premium Booked	3,000	2,700
Expected Reinsurance Costs		500
Undiscounted Loss, ALAE and ULAE Ratio	60%	70%
Discount Factor	0.98	0.96
PfAD for Investment Return Rates		30
MfAD for Claims Development		6%
MfAD for Reinsurance		3%

Maintenance Expenses (% of gross premium)	2.5%
DPAE from Accounting Department	700
Unearned (Reinsurance) Commissions	250

a. (2 points)

Calculate the maximum deferred policy acquisition expenses that the company can record on its financial statements.

b. (0.5 point)

Explain whether or not a premium deficiency exists.

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16. (1.75 points)

The following information is available for a property and casualty insurance company that writes only personal property insurance as at December 31, 2016. All amounts are in thousands of dollars ($000s).

Appointed Actuary's estimates

Net Undiscounted Estimate	810,000
Net Discounted Estimate including PfADs	816,200
Discount Rate, including interest MfAD	5%

Calendar year payout pattern

Year 1	60%
Year 2	25%
Year 3	10%
Year 4	5%

Other information:

- All payments are made in the middle of the year.
- The net claim liabilities amount carried in the Annual Return is 820,000.
- The future income tax rate is 35%.

a. (0.5 point)

Define the asset for future income taxes.

b. (1.25 points)

Calculate the estimated effect of discounting the asset for future income taxes.

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17. (3 points)

A property and casualty insurance company provides earthquake insurance to their insureds and considers purchasing a catastrophe treaty. However, it has struggled with finding an accurate way of quantifying earthquake risk. Earthquake simulation model results show that the probability of a catastrophic event is extremely low.

a. (1 point)

Describe "reasonably self-evident" risk transfer and discuss whether it applies to this treaty.

b. (1 point)

The use of reinsurance pricing assumptions could help assess risk transfer. Describe one advantage and one disadvantage of this method.

c. (1 point)

Briefly describe four practices that the company could use to improve the earthquake risk estimation process and strengthen the catastrophic risk management.

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18. (2 points)

a. (1 point)

Briefly describe two reasons for a reinsurer to commute a claim and two reasons for an insurer to commute a claim.

b. (1 point)

Claims subject to commutation have expected cash flows that extend into the future. Briefly describe two financial and two non-financial considerations associated with the future cash flows in the settlement of these claims.

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19. (2.75 points)

The following information is available for a property and casualty insurance company as at December 31, 2016. All amounts are in thousands of dollars ($000s).

	Value
PML 500, East Canada	80,000
PML 250, East Canada	20,000
PML 500, West Canada	300,000
PML 250, West Canada	120,000
Common Shares Issued and Paid	55,000
Retained Earnings	175,000
Accumulated Other Comprehensive Income	40,000

The company's earthquake risk is managed via the following reinsurance coverage for any earthquake occurrence:

Layer	Ceded to Reinsurers
25,000 xs 0	0%
25,000 xs 25,000	50%
100,000 xs 50,000	90%
100,000 xs 150,000	100%

The insurance company does not have earthquake premium reserves.

a. (2.25 points)

Calculate the insurance company's earthquake reserves as at December 31, 2016 with the phase-in to the countrywide PML500 requirement.

b. (0.5 point)

Describe an alternate approach to determine earthquake reserves for insurance companies that do not use models.

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20. (2 points)

The following information is available from the December 31, 2016 P&C-1 of an insurance company. All amounts are in thousands ($000s).

Capital (Margin) Required for Interest Rate Risk		
	Fair Value	Modified or Effective Duration
Interest rate sensitive assets:		
Term deposits	0	0.00
Bonds and debentures	900	4.75
Commercial paper	0	0.00
Loans	0	0.00
Mortgages	50	25.00
MBS and ABS	0	0.00
Preferred shares	50	3.00
Other (specify)	0	0.00
Total interest rate sensitive assets	1,000	
Interest rate sensitive liabilities:		
Net unpaid claims and adjustment expenses	500	2.50
Net premium liabilities	100	2.75
Other as approved by OSFI	0	
Total interest rate sensitive liabilities	600	

a. (0.5 point)

Define interest rate risk.

b. (0.5 point)

Contrast effective duration and modified duration.

c. (1 point)

Calculate the margin required for interest rate risk at target based on a 125 basis point interest rate shock factor.

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21. (2.25 points)

In the context of the dynamic capital adequacy testing (DCAT) analysis, a property and casualty insurance company wants to evaluate the impact of a decline in the stock market. Based on an analysis of past common shares performance, the following distribution was established:

Percentile	Decline of common shares portfolio
80.0%	-10.0%
90.0%	-20.0%
99.0%	-40.0%
99.5%	-50.0%

The following additional information is available:

- The shock is tested at the end of 2018.
- Assume that there is no tax implication.
- Assume that the impact of the decline in common shares flows to the income statement.
- The MCT risk factor for equity risk is 30%.
- Assume that the MCT total uncapped operational risk margin is less than 30% of the sum of asset and insurance risk.
- Assume that there is no impact on investments other than common shares following the market decline.

The following information from the DCAT base scenario for 2017 and 2018 is available:

	2017	2018
Common shares portfolio	90,000	90,000
Capital available	100,000	100,000
Capital required for insurance risk	20,000	20,000
Capital required for credit risk	5,000	5,000
Capital required for equity risk	27,000	27,000
Capital required for interest rate risk	2,000	2,000
Capital required for foreign exchange risk	0	0
Capital required for operational risk	5,000	5,000
Diversification credit	6,714	6,714
MCT ratio	287%	287%

Evaluate the impact of a plausible adverse scenario on the 2018 MCT ratio.

CONTINUED ON NEXT PAGE

22. (2.25 points)

A Canadian property and casualty insurance company writes insurance in an earthquake-prone region. The management of the company designs a stress testing program.

a. (0.75 point)

Management only considers insurance risk in the stress testing as they feel it is the most significant risk. Discuss the appropriateness of this approach and justify one change if necessary.

b. (0.75 point)

Management does not consider an earthquake scenario in the stress testing as the company has not experienced an earthquake since its inception. Discuss the appropriateness of this approach and justify one change if necessary.

c. (0.75 point)

The company has a significant portion of its investment portfolio invested in the local real estate market. Briefly describe the interactions between risks that an effective stress testing program would likely reveal.

CONTINUED ON NEXT PAGE

23. (3.25 points)

a. (0.5 point)

Briefly describe two scenarios that would lead to an increase in capital charges for investment risk in A.M. Best's net required capital calculation.

b. (1 point)

Identify and briefly describe the two risk categories other than investment risk used in A.M. Best's net required capital calculation.

c. (0.5 point)

Describe the purpose of the "square root rule" used in A.M. Best's BCAR formula.

d. (0.25 point)

Describe the purpose of A.M. Best's natural catastrophe stress testing.

e. (1 point)

Given the following information, explain which company is more likely to have A.M. Best allow its stress-tested BCAR score to fall below the BCAR guidelines.

	Company A	Company B
Company Profile	Mutual insurance company	Publicly traded insurance company
Line of Business	Commercial Property	Personal Auto, Personal Property, Commercial Auto and Commercial Property
Primary Cat Exposure	Hail	Earthquake

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24. (5 points)

The following information is available regarding a property and casualty insurance company's MCT as at December 31, 2016. All amounts are in thousands of dollars ($000s).

Minimum Capital Test

	Current Period
Total Capital Available	53,000
Capital Required at Target:	
Insurance Risk	21,000
Market Risk	?
Credit Risk	2,500

Operational Risk Margin

	Direct premiums written in the past 12 months	Assumed premiums written in the past 12 months - third party reinsurance	Ceded premiums written in the past 12 months - third party reinsurance
Personal Property	90,000	2,000	3,000
Automobile – Liability and Personal Accident	182,000	5,000	11,000
Risk Factors	2.50%	1.75%	2.50%

Other information:

- There is no transition adjustment in MCT calculations.
- The correlation factor between the asset risk and the insurance risk is 50%.
- The growth in gross premiums written in the past 12 months is 12%.
- The company does not have intra-group pooling arrangements.
- The risk factor applied to total capital required, before the operational risk margin and diversification credit, for the calculation of the operational risk margin is 8.5%. The operational risk cap does not apply.
- The solutions of an equation of the form $ax^2 + bx + c = 0$ are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

<< QUESTION 24 CONTINUED ON NEXT PAGE >>

a. (1.5 points)

Calculate the amount of capital required for market risk that would trigger an early warning intervention from OSFI.

b. (1.5 points)

Discuss how reinsurance agreements with unregistered reinsurers would impact the following MCT components:

i. Capital available
ii. Credit risk
iii. Operational risk

c. (1 point)

Briefly describe four ways in which the Own Risk and Solvency Assessment (ORSA) is a better management tool for the Board of Directors compared to the MCT.

d. (1 point)

Fully contrast the responsibilities of an external peer reviewer and an external auditor.

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25. (2.5 points)

a. (1 point)

The Canadian Institute of Actuaries' Standards of Practice specify the ranges for margins for adverse deviation (MfAD). Identify the range for claims development MfAD and investment return rate MfAD and for each, briefly describe one situation where they can be selected outside of these ranges.

b. (1 point)

Briefly describe four considerations related to an insurance company's operations that an actuary should contemplate when selecting the claims development MfAD.

c. (0.5 point)

Briefly describe two types of risk that the investment return rate MfAD would address.

CONTINUED ON NEXT PAGE

26. (1.75 points)

a. (0.75 point)

Identify three considerations in determining the interest rate used to discount policy liabilities.

b. (1 point)

Describe how the following two situations can be addressed when calculating an interest rate to discount the policy liabilities of an insurance company:

i. Positive net cashflow
ii. Negative net cashflow

CONTINUED ON NEXT PAGE

27. (2.25 points)

a. (0.75 point)

Briefly describe the three circumstances under which a subsequent event needs to be accounted for.

b. (1.5 points)

The Appointed Actuary of a property and casualty insurance company is valuing policy liabilities as at December 31, 2016. The report date is February 19, 2017. For each of the following scenarios, briefly discuss the actions that the Appointed Actuary should take.

i. On March 7, 2017, it was discovered that due to a system issue, all automobile physical damage claims reported in December were reported at the opening case reserve instead of at their actual claim amounts.

ii. A major winter storm occurred on February 12, 2017.

iii. Automobile insurance reforms were announced on February 26, 2017, where the threshold on minor injury claims was lowered from $5,000 to $2,500 in a province. The insurance company writes 50% of its automobile business in that province.

END OF EXAMINATION

Exam 6-Canada
Regulation and Financial Reporting

May 3, 2017

POINT VALUE OF QUESTIONS

QUESTION	VALUE OF QUESTON	SUB-PART OF QUESTION						
		(a)	(b)	(c)	(d)	(e)	(f)	(g)
1	2.75	1.00	0.50	1.25				
2	2.00	1.00	1.00					
3	1.50	0.50	0.50	0.50				
4	2.25	0.75	0.75	0.75				
5	1.75	0.50	1.00	0.25				
6	2.50	0.50	0.50	0.25	0.25	0.50	0.25	0.25
7	3.50	0.50	2.00	1.00				
8	2.25	0.25	1.00	1.00				
9	2.50	1.50	0.50	0.50				
10	3.00	3.00						
11	3.25	3.25						
12	3.50	3.50						
13	3.25	1.75	1.00	0.50				
14	1.75	1.00	0.75					
15	2.50	2.00	0.50					
16	1.75	0.50	1.25					
17	3.00	1.00	1.00	1.00				
18	2.00	1.00	1.00					
19	2.75	2.25	0.50					
20	2.00	0.50	0.50	1.00				
21	2.25	2.25						
22	2.25	0.75	0.75	0.75				
23	3.25	0.50	1.00	0.50	0.25	1.00		
24	5.00	1.50	1.50	1.00	1.00			
25	2.50	1.00	1.00	0.50				
26	1.75	0.75	1.00					
27	2.25	0.75	1.50					
28	0.00							
29	0.00							
30	0.00							
31	0.00							
32	0.00							
33	0.00							
34	0.00							
35	0.00							
36	0.00							
37	0.00							
38	0.00							
39	0.00							
40	0.00							
41	0.00							
42	0.00							
43	0.00							
44	0.00							
45	0.00							
TOTAL	69.00							

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

GENERAL COMMENTS:

- Candidates should note that the instructions to the exam explicitly say to show all work; graders expect to see enough support on the candidate's answer sheet to follow the calculations performed. While the graders made every attempt to follow calculations that were not well-documented, lack of documentation may result in the deduction of points where the calculations cannot be followed or are not sufficiently supported.
- Candidates should justify all selections when prompted to do so. For example, if the candidate selects an all year average and the question prompts a justification of all selections, a brief explanation should be provided for the reasoning behind this selection. Candidates should note that a restatement of a numerical selection in words is not a justification.
- Incorrect responses in one part of a question did not preclude candidates from receiving credit for correct work on subsequent parts of the question that depended upon that response.
- Candidates should try to be cognizant of the way an exam question is worded. They must look for key words such as "briefly" or "fully" within the problem. We refer candidates to the Future Fellows article from December 2009 entitled "The Importance of Adverbs" for additional information on this topic.
- Some candidates provided lengthy responses to a "briefly describe" question, which does not provide extra credit and only takes up additional time during the exam.
- Candidates should note that the sample answers provided in the examiner's report are not an exhaustive representation of all responses given credit during grading, but rather the most common correct responses.
- In cases where a given number of items were requested (e.g., "three reasons" or "two scenarios"), the examiner's report often provides more sample answers than the requested number. The additional responses are provided for educational value, and would not have resulted in any additional credit for candidates who provided more than the requested number of responses. Candidates are reminded that, per the instructions to the exam, when a specific number of items is requested, only the items adding up to that number will be graded (i.e., if two items are requested and three are provided, only the first two are graded).
- It should be noted that all exam questions have been written and graded based on information included in materials that have been directly referenced in the official syllabus, which is located on the CAS website. The CAS takes no responsibility for the content of supplementary study materials and/or manuals produced by outside corporations and/or individuals which are not directly referenced in the official syllabus.

EXAM STATISTICS:

- Number of Candidates: 97
- Available Points: 69
- Passing Score: 46.75
- Number of Passing Candidates: 41
- Raw Pass Ratio: 42.27%
- Effective Pass Ratio: 43.16%

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 1	
TOTAL POINT VALUE: 2.75	**LEARNING OBJECTIVE(S): A1**

SAMPLE ANSWERS

Part a: 1 point

Any four of the following:

- regulation of trade and commerce
- raising money by taxation
- banking
- bankruptcy and insolvency
- naturalization and aliens
- criminal law
- peace, order and good of government

Part b: 0.5 point

Any two of the following:

- conditions that must be satisfied for a company to enter into the business of insurance
- reports relating to the financial condition of the company that must be submitted at regular intervals
- control over the investments, calculation of asset values and policy reserves
- protecting the interests of policyholders in areas other than those related to the control of insurance

Part c: 1.25 points

Sample 1

All 5 items are intra vires of provincial legislation

Sample 2

i. yes
ii. yes
iii. yes
iv. yes
v. yes

EXAMINER'S REPORT

Candidates were expected to differentiate between federal and provincial responsibilities when it comes to legislation and insurance regulation.

Part a

Candidates were expected to list four items intra vires of the federal Parliament.

A common error was not listing enough items, or providing vague answers like "make law". In particular, "criminal law" was infrequently provided as an answer.

Part b

Candidates were expected to understand areas of federal legislation concerns with regard to insurance company financial soundness.

A common error was not being specific enough such as just answering "insurer can fulfill obligation to policyholders." Candidates would need to provide more detail such as that provided above in the sample answers.

Part c

Candidates were expected to state that all five items were intra vires, that is, all five items could be legislated by the provincial government if it wished to. Candidates were expected to synthesize material across the syllabus to determine answers to part c.

Common errors included incorrect answers on sub-parts iii. and iv.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 2	
TOTAL POINT VALUE: 2	**LEARNING OBJECTIVE: A2**
SAMPLE ANSWERS	

Part a: 1 point

Arguments for

Any two of the following:

- Credit shows a statistically significant relationship to expected loss
- Credit won't affect the overall rate, but will allow for fair segmentation of risks and prevent subsidization
- Easily obtainable
- It is an objective variable that can't be manipulated
- It allows insurers to insure more people

Arguments against

Any two of the following:

- Use of credit is discriminatory to various groups, e.g., young individuals, recent immigrants, elderly, etc.
- Credit data is not always accurate, and can be affected by factors outside the insured's control, such as identity theft
- Can be seen as invasion of privacy
- Sometimes extraordinary event would impact credit info (eg. Divorce, identity theft) which should not impact insurance premium
- Credit information that is collected could be incorrect
- Tough economic times could disrupt the relations amongst credit scores making it unreliable/unfair
- Causal effect difficult to understand for insured
- Expensive to obtain
- It might be the case that insureds with high credit scores pay more out of pocket claims

Part b: 1 point

Any four of the following:

- Consent has to be explicit and clear
- Nobody else can consent on behalf of the policyholder
- Insured must be told what information is being gathered
- Insured must be told what the information will be used for
- Insured must be free to decline consent
- Need to obtain informed consent
- Insurer cannot presume consent will be given
- Must use current up-to-date credit information
- Cannot use the information to decline/not renew a driver
- The exact nature of the information sought should be disclosed
- Consent should be obtained in accordance to PIPEDA regulations

- Keep proof of consent
- Insurer cannot refuse to quote
- Insurer must allow insured to correct errors in their credit information and adjust rating accordingly

EXAMINER'S REPORT

Candidates were expected to articulate the merits and drawbacks of using credit information as a rating variable.

In part b, candidates were expected to be familiar with IBC's code of conduct with respect to obtaining consent and using credit information.

Part a

Candidates were expected to state two reasons for using credit information as a rating variable and two reasons against using credit information as a rating variable.

Common errors include:

- Providing two arguments that were related.
- Lacking justification/explanation in the response, such as "using credit information can produce more accurate, non-excessive, not unfairly discriminatory rates". Rather, the candidate was expected to mention how the information "can produce more accurate, non-excessive, not unfairly discriminatory rates."

Part b

Candidates were expected to list four principles associated with the consent and collecting of credit information for rating purposes.

Common errors include:

- A lack of detail/explanation, such as simply mentioning "period of consent" or "request for consent".
- Mentioning two principles that were related.
- Stating "credit score should exclude effect of big events". An insured can make a request to adjust the rating factor following a big event but the credit score would not change.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 3	
TOTAL POINT VALUE: 1.5	**LEARNING OBJECTIVE(S): A2**

SAMPLE ANSWERS

Part a: 0.5 point

Sample answers include the following:

- Approval is not needed under File and Use system, but regulator has the right to review / intervene the rates. Also expedited prior approval can obtain approval within 30 days. The statement is not accurate.
- True. Prior approval must be approved earlier and must contain more details than File and Use.
- It is not always true. File and Use has less documentation required. Both of them need to send rate for approval before they could use. File and Use in general get approval in 90 days.

Part b: 0.5 point

Sample answers include the following:

- No. It is wrong. Under open competition system there is no need for approval for premium rate; while prior approval system insurer has to send rate for approval before they could use.
- Given Open Competition does not require filing there is no wait time to change rates thus yes much faster than prior approval.

Part c: 0.5 point

Sample answers include the following:

- Inaccurate. File and use and use and file requires insurers to submit filing within set days before or after implementing rates. Independent of regulatory approval time.
- Accurate, since insurer can use rates now and file them within x numbers vs has to wait x number of days after filing.

EXAMINER'S REPORT

Candidates were expected to demonstrate knowledge of different rate regulation systems.

<u>For each of a, b and c:</u>

Candidates were expected to articulate an argument where they demonstrated a basic understanding of the mechanism behind rate approval under the two rate regulation systems in the question.

The most common error was providing answers that pertained to the incorrect rate regulation system for the particular question.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 4	
TOTAL POINT VALUE: 2.25	**LEARNING OBJECTIVE(S): A3**

SAMPLE ANSWERS

Part a: 0.75 point

Sample answers include the following:

- Insurer would not be required to pay. The Insured has suffered a pecuniary loss (medical expenses), so this would be ruled as a contract of indemnity. Under a contract of Indemnity, double-recovery is not permitted. Relevant case is the Glynn case.
- Relevant precedent: Glynn v Scottish. In this case, a first trial ruled that the insurer needed to pay for the loss of the insured but on appeal, the decision was reversed. Insurer doesn't need to pay for the claim. Because it is a contract of indemnity. And under a contract of indemnity, the insurer needs to be able to subrogate. Therefore, in this case the insurer won't have to pay for the medical expense.

Part b: 0.75 point

Sample answers include the following:

- Precedent is the Regal Films case. Ruling is that the "fire part" of the Act can't be evaded by calling it an inland marine policy. Fire part allows proof to be filled "as soon as practicable". So the insurer would have to pay the claim.
- This case is substantially similar to KP Pacific Holding Co. According to the precedent, the contents of the insurance contract (in this case is fire & other perils) is more important than the policy header of "inland marine policy". If taken to court, the insurer will likely be forced to pay the loss, as the court will treat this as fire insurance.

Part c: 0.75 point

Sample answers include the following:

- Relevant precedent is the Somersall case. Ruling is that the amount of damages owed to the insured are determined based on what the insured was entitled to at the time of the accident. Since the limit agreement was created after the accident, the insurer will be required to pay the amount in excess of what the insured has received from the other driver.
- Somersall vs Scottish & York. The insurer would have to pay because the limit agreement did not: 1) prevent insured from being fully compensated for entitlement at the accident. 2) Insurer's right of subrogation after insured is fully compensated.

EXAMINER'S REPORT

Candidates were expected to discuss the issues, outcome, rationale and implications of landmark decisions for the insurance industry.

Part a

Candidates were expected to discuss the issues, outcome, rationale and implications of decisions for the case Glynn v. Scottish Union & National Insurance Co. Ltd.

A common error was stating that the insurer would be likely to pay, for example:

- The court is likely to request the insurer to pay the claimant and then subrogate the full medical expense from the negligent driver.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

Part b

Candidates were expected to discuss the issues, outcome, rationale and implications of decisions for the case Regal Films Corporation Ltd v. Glens Falls Insurance Company or the case KP Pacific v. Guardian.

A common error was stating the correct conclusion however, including incorrect reasoning, for example:

- The insurer will have to pay the claim. There is no express time limit on inland marine policies. The requirement is that proof is provided as soon as practicable.

Part c

Candidates were expected to discuss the issues, outcome, rationale and implications of decisions for the case Somersall v. Friedman or the case Somersall v. Scottish & York.

Common errors include not providing enough information to support the conclusions, for example:

- Insurer is right. The insurer should be notified asap instead of after the agreement.
- The concern of this case is to state if the subrogation clause applies. The insured limits his insurer to recover claims. The likely outcome is that insurer won't have to pay.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 5	
TOTAL POINT VALUE: 1.75	**LEARNING OBJECTIVE(S): A3**

SAMPLE ANSWERS

Part a: 0.5 point

Sample answers include the following:

- The Judge put a rough upper limit on non-economic loss of $100K to protect the stability and predictiveness of legal system.
- Established a cap of non-pecuniary general damages.

Part b: 1 point

Sample answers include the following:

- If the case were appealed to Supreme Court, the Judge may adjust the award to $100K with index of inflation. The original amount of $125K considers that the plaintiff is more severely injured than victims in Trilogy and Trilogy was 1.5 years old. However, the award is not compensatory hence should not consider the level of injury. The goal of the cap is to make life better and ensure the affordability of P&C insurance as well as stability of legal system.
- In Lindal v. Lindal, Judge Dickson ruled that it is not proper to compare the extent of injuries of victims since non-pecuniary damages are not meant to compensate. However, it is appropriate to increase the cap with inflation. As a result, the award would likely to be lowered to 100K in 1978 dollars. (Since Fenn v. Peterborough occurred in 1979, it is unlikely that the inflation rate would yield an award of $125K.)

Part c: 0.25 point

Sample answers include the following:

- They dismissed the leave to appeal which means that they probably still support the limit on non-pecuniary damages for personal injury.
- The Supreme Court refuses to look at this case probably because the court was still recognizing the rationale for the cap.

EXAMINER'S REPORT

Candidates were expected to discuss the issues, outcome, rationale and implications of decisions on the Canadian cap for non-pecuniary general damages.

Part a

Candidates were expected to describe the outcome of the Trilogy of Supreme Court of Canada decisions.

A common error was confusing punitive damages with non-pecuniary damages, for example:

- The trilogy established a rough upper limit of $100K for punitive damages.

Part b

Candidates were expected to apply the rationale of the Canadian cap for non-pecuniary general damages to a real case.

A common error was not understanding how the level of injury and inflation should be taken into account, for example:

- General damages allowed are below the non-pecuniary cap, so this is not a concern with this case
- Supreme Court will likely allow the general damage awarded to be at $125K because 1) the insured suffer worse injuries than the 3 injured from the Trilogy. 2) $125K is only slightly higher than $100K, will not be a social burden.

Part c

Candidates were expected to describe the current state of cap.

A common error was not understanding the cap on non-pecuniary general damages became a rule of law as a result of the decisions on Trilogy while the Lee v. Dawson decision implied the cap remained a rule of law. For example:

- It implies the cap on non-pecuniary general damages becomes a rule of law.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 6	
TOTAL POINT VALUE: 2.5	**LEARNING OBJECTIVE(S): A4**

SAMPLE ANSWERS

Part a: 0.5 point

Sample answers include the following:

- Plaintiff can recover from one or more of the at-fault defendants
- Plaintiff can sue multiple defendants if they are found responsible. Plaintiff can be compensated fully from remaining defendants if other defendants went bankrupt
- Insured is able to recover damages from any defendant who is liable regardless of their percentage of fault
- It is a recovery system that allows claimants to recover collectively from several defendants or individually from single defendant
- Liable parties are responsible for the compensation to insured no matter how much fault they are responsible for. For example, a party which is only 5% fault could pay all of the compensation if other parties all default
- It allows a plaintiff to recover 100% of damages from a defendant who may only be partially at fault

Part b: 0.5 point

Sample answers include the following:

- Plaintiff will be fully indemnified regardless of the solvency of a particular defendant
- Increases the efficiency of the legal system by reducing the number of trials

Part c: 0.25 point

Sample answers include the following:

- Lawyers may name defendants with little fault but with deep pockets in order to maximize awards
- Not fair for defendants with small portion of fault to bare the majority of liability
- Defendants may have to pay more than their fair share because of insolvent defendants

Part d: 0.25 point

Sample answers include the following:

- Defendants are only responsible for the portion of their assigned fault
- Each defendants pays a percentage of damages equal to their percentage at fault
- If only 5% liable, only have to pay 5% of damage

Part e: 0.5 point

Sample answers include two the following:

- Change to proportionate liability (or reform the rule to several liability)
- Establish industry fund/trust/pool to cover the liability of the insolvent defendants
- Bar application of joint and several liability for non-pecuniary damages
- Only have joint and several liability apply if a defendant is liable above a certain threshold (i.e. 25%)

Part f: 0.25 point

Sample answers include the following:

- A defendant who was not involved in the manufacture or sale of asbestos, but who has exposure through use of products/buildings containing asbestos
- Those involved in the asbestos use or production, but not the key players
- Are defendants whose products encapsulated asbestos products of major defendants
- Defendants that were sued because of peripheral use of asbestos

Part g: 0.25 point

Sample answers include the following:

- Primary asbestos defendants often became insolvent, so peripheral defendants would be liable for the full amount of damages
- When the key players are being sued and go bankrupt, these peripheral defendants will have to pay all the remaining damage
- If the primary defendants are bankrupt, they may have to pay for 100% of damages even though they are only partly at fault

EXAMINER'S REPORT

Candidates were expected to describe the litigation environment with respect to insurance and know the concepts of joint and several liability and proportionate liability. They were also expected to know about the asbestos mass tort event.

Part a

Candidates were expected to know the definition of joint and several liability.

No common errors were made; candidates performed well on this part.

Part b

Candidates were expected to know the advantages of joint and several liability.

Common errors were:

- Providing two answers that were similar to each other. For example, to protect the plaintiff who suffer injuries or losses so they can be compensated fully and plaintiff will not worry too much about one defendant being bankrupt
- Only providing one reason

Part c

Candidates were expected to know the disadvantage of joint and several liability.

No common errors were made; candidates performed well on this part.

Part d

Candidates were expected to know the definition of proportionate liability.

No common errors were made; candidates performed well on this part.

Part e

Candidates were expected to know potential reforms to joint and several liability that could reduce settlement costs to the defendant.

Common errors were:

- Stating that eliminating pre-judgement interest was a potential reform. This was not accepted as it is not related to joint and several liability specifically, but is another legal reform.
- Providing an incomplete response by only describing one reform instead of two.

Part f

Candidates were expected to be able to describe the litigation environment with respect to asbestos mass tort including the concept of peripheral defendants.

A common error was:

- Failing to mention how peripheral defendants had used asbestos in their products. For example:
    - Group of defendants jointly liable with main asbestos defendants, but to a lesser degree.
    - They are defendants not primarily at fault, however they have deep pockets and are sued so that plaintiff may recover full awards

Part g

Candidates were expected to know how peripheral asbestos defendants may be disadvantaged in a jurisdiction that applies joint and several liability.

A common error was:

- Not mentioning why peripheral defendants may be held liable (if the primary defendant (i.e., manufacturer of asbestos) became insolvent or bankrupt). For example:
    - Claimants are able to recover full damages from peripheral asbestos defendants in jurisdictions with joint and several liability
    - Peripheral defendants will pay large amount of money, but liability is very low

QUESTION 7

TOTAL POINT VALUE: 3.5	**LEARNING OBJECTIVE(S): B1 to B3**

SAMPLE ANSWERS

Part a: 0.5 point

Sample answers include the following:

- FARM: provide auto insurance to drivers who can't find it in the voluntary market. RSP: allow insureds to cede risks on their own books for which they consider premiums to be inadequate
- RSP: allows insurers to write a riskier set of insureds and pool the costs to limit their losses. FARM: is an insurer of last resort, ensuring that compulsory insurance can be sold to risks that no insurer will write

Part b: 2 points

Sample answers include the following:

i) rates and rules

- RSP: rates are insurer's own standard manual rates. FARM: uses FA rates
- RSP: use insurer's rates and rules, FARM: uses FA's rates and rules
- RSP: uses the ceding company's rates and rules, FARM: has its own rates and rules

ii) servicing carriers

- RSP: serviced by the ceding company, FARM: selected companies service policies
- RSP: policies/claims administered by member, FARM: policies/claims administered by servicing companies
- RSP: insurer services policies and claim wording, FARM: may have 3rd party to service policies and claim handling

iii) policyholder awareness

- RSP: policyholder is unaware, FARM: policyholder know they are a FARM risk
- RSP: not aware of assignment, FARM: aware of assignment

iv) treatment of losses in Ontario Private Passenger Automobile Filing

- RSP: include, FARM: excluded as it's not business of the insurer
- RSP: included in loss analysis, FARM: excluded from loss analysis

Part c: 1 point

Any four of the following;

- PPA non-fleet, non-pool business
- Based on business not in the PPA non-fleet non-pool category or in any risk sharing pool
- Business ceded to the pool in AB, NB, NS (or vehicles in a risk sharing pool except Ontario)
- Business ceded to the pool in Ontario or vehicles transferred to a risk sharing pool other than a risk sharing pool in AB, NB, NS or ON cat fund

- Vehicles in a catastrophic claim or uninsured motorist pool

EXAMINER'S REPORT

Candidates were expected to demonstrate an understanding of the risk sharing pool and Facility Association residual market and know details about a member's participation in the Facility Association results.

Part a

Candidates were expected to know the purposes of the risk sharing pool and the Facility Association residual market.

A common error was:

- Not commenting on the transfer of risk when describing the purpose of the risk sharing mechanism. For example:
  - RSP allows insurer to accept risk from risky insured leading to greater availability
  - RSP ensures all PPV drivers have insurance coverage

Part b

Candidates were expected to know the difference between the risk sharing pool and the Facility Association residual market.

Common errors were:

- For i) rates and rules:
  - No common errors were made; candidates performed well on this question
- For ii) servicing carriers:
  - Stating that FA takes risks directly from agents and brokers
  - Stating that FARM is the servicing carrier
- For iii) policyholder awareness:
  - No common errors were made; candidates performed well on this question
- For iv) treatment of losses in Ontario PPA filing:
  - Stating that for RSP - ceded risks are negative direct business and negative losses
  - Stating that for RSP – insurer are responsible for 15% of the losses, cede 85%,
  - Stating that for FARM – 100% of losses are transferred to FARM
  - Stating that for FARM claims are all paid according to the participation ratio of voluntary insurer's premium

Part c

Candidates were expected to identify classes of business that determine a member's participation in the Facility Association results.

Common errors were:

- Providing PPA, non-fleet as a class when it should have been non-pool, non-fleet PPA
- Stating fleet, commercial auto, motorcycle were classes of business
- Providing the formula for the participation ratio

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 8	
TOTAL POINT VALUE: 2.25 points	**LEARNING OBJECTIVE(S): B3**
SAMPLE ANSWERS	
Part a: 0.25 point	
A probable yield represents the expected yield per unit of exposure for a given producer, agricultural product and crop year.	
Part b: 1 point	
Any four of the following: • Adjustments for changes in farming or management practices • Adjustments for changes in insurance program design • Trends in technology or genetic improvement, based on observed historical data and usually confirmed by agronomical specialists • Adjustments for maturity of perennial plants (e.g. fruit trees exhibit increasing and decreasing yield patterns over time) • Adjustments for quality, which are required in situations where an insured peril would affect the quality of the production (as opposed to the quantity only) and as such decrease the market value of the agricultural product • Changes in data sources and in data collection methodologies • Variations in the mix of insureds over time and across geographical regions • Improvements in risk management practices • Changes in technology • Weather pattern trends • New methodology for calculating premium rate • New product used in production	
Part c: 1 point	
All four of the following: • Long-term averaging methods • Cushioning: Occurrences outside of a given statistical measure of deviation around the mean may be allocated smaller weights when averaging historical yields in order to avoid distortions • Smoothing: Floors and ceilings may be applied to historical yields outside of a given statistical measure of deviation around the mean • Capping in year-over-year changes in probable yield	
EXAMINER'S REPORT	
Candidates were expected to have an understanding of the objectives, operations, and effectiveness of Canadian agricultural risk management	
Part a	
Candidates were expected to include at least three of the following agriculturally-related ideas: • Expected/ average yield • Per exposure unit • For a given producer/ agricultural product • Per crop year	

A common error was not providing sufficient detail in the answer and only including one or two of the aforementioned agriculturally-related ideas.

Part b

Candidates were expected to provide a brief description of each adjustment.

Common errors include:

- Stating catastrophe and weather-related adjustments without providing sufficient explanation to distinguish the two.
- Simply stating cost trend or trend without further descriptions.
- Not providing all four adjustments.

Part c

Candidates were expected to be able to identify the four stabilizing techniques described in the paper.

Common errors include:

- Not providing all four techniques; "long term averaging" and "cushioning" were most frequently missed by candidates.
- Mixed up the "capping" versus "smoothing" definitions.
- Stating adjustments to improve the accuracy of probable yields (such as those listed in part b.), as opposed to techniques to improve their stability.

QUESTION 9	
TOTAL POINT VALUE: 2.5	**LEARNING OBJECTIVE(S): B3**

SAMPLE ANSWERS

Part a: 1.5 points

Any three of the following:

- Canada Pension Plan (CPP/QPP) – provides a monthly income replacement after retirement to retirees which is funded by employees and employers
- Old Age Security (OAS) – provides monthly benefits to all who reach age 65 and meet certain residence requirements, but is subject to a special tax or "clawback."
- Guaranteed Income Supplement (GIS) – provides monthly benefits in addition to OAS benefit subject to an income test and residence requirements.
- Allowance and Survivor's Allowance – provides benefits paid out between ages 60 and 64 to the living or deceased pensioner's spouse or common-law partner

Part b: 0.5 point

Any two of the following:

- Canada Pension Plan (CPP/QPP) – funded by contributions from employers and employees
- Old Age Security (OAS) – financed on a pay-as-you-go basis from government general tax revenue
- Guaranteed Income Supplement (GIS) – financed on a pay-as-you-go basis from government general tax revenue

Part c: 0.5 point

Any two of the following:

- Canada Pension Plan (CPP/QPP) – benefit taxed normally as part of income
- Old Age Security (OAS) – benefit taxed normally as part of income and subject to "clawback" tax
- Guaranteed Income Supplement (GIS) – Benefit is not taxed

EXAMINER'S REPORT

Candidates were expected to demonstrate an understanding of government and social insurance industry programs.

Part a

Candidates were expected to list three government supported tiers of Canadian income security and provide a brief description on each.

Common errors include:

- Listing Registered Retirement Savings Plans (RRSP), Employment Insurance (EI), or Workers Compensation (WC) as one of the three tiers
- Simply identifying the programs without describing the program

Part b

Candidates were expected to demonstrate an understanding of the funding behind the programs.

Common errors include:

- Canadian Pension Plan (CPP/QPP) – indicating this program was funded by government
- Old Age Security (OAS) – indicating this program was funded by employee/employer contributions, or government revenue

Part c

Candidates were expected to demonstrate that they know how the benefits from these programs are taxed.

Common errors include:

- Canada Pension Plan (CPP/QPP) – indicating that the contribution was taxed
- Old Age Security (OAS) – indicating this was not taxed, or was not part of taxable income
- Guaranteed Income Supplement (GIS) – indicating that this was taxed

QUESTION 10

TOTAL POINT VALUE: 3.0 | **LEARNING OBJECTIVE(S): B2**

SAMPLE ANSWERS

One Year Version

Calculation			Scenario 1 Base	Scenario 2 Build a Dike	Scenario 3 Build a Floodway
(1)	given	Number of Homes	10,000	10,000	10,000
(2)	given	Value of Homes	$500,000	$500,000	$500,000
(3)	given	Damage Ratio	25%	25%	25%
(4)	(2)x(3)	Average Loss (Severity)	$125,000	$125,000	$125,000
(5)	given	Return Period (Years)	50	250	500
(6)	1/(5)	Return Period (% Chance Per Year) (Frequency)	2.00%	0.40%	0.20%
(7)	(4)x(6)	Average Insurance Premium (ELC)	2,500	500	250
(8)	given	Assumed Insurance Uptake Rate	50%	75%	100%
(9)	(1)x(7)x(8)	Total Insurance Premium Collected (Per Year)	$12,500,000	$3,750,000	$2,500,000
(10)	(1)x(7)	Total Economic Losses (Per Year)	$25,000,000	$5,000,000	$2,500,000
(11)	(10)-(9)	Total Uninsured Losses (Per Year)	$12,500,000	$1,250,000	$0
(12)	given	Cost of Flood Prevention Scenario (One Time)	$0	$100,000,000	$150,000,000
(13)	(10)+(12)	Economic Cost - based on economic loss (1 Year)	$25,000,000	$105,000,000	$152,500,000
(14)	(11)+(12)	Economic Cost - based on uninsured loss (1 Year)	$12,500,000	$101,250,000	$150,000,000

Five Year Version

Calculation			Scenario 1 Base	Scenario 2 Build a Dike	Scenario 3 Build a Floodway
(1)	given	Number of Homes	10,000	10,000	10,000
(2)	given	Value of Homes	$500,000	$500,000	$500,000
(3)	given	Damage Ratio	25%	25%	25%
(4)	(2)x(3)	Average Loss (Severity)	$125,000	$125,000	$125,000
(5)	given	Return Period (Years)	50	250	500
(6)	5/(5)	Return Period (% Chance in 5 Years) (Frequency)	10.00%	2.00%	1.00%
(7)	(4)x(6)	Average Insurance Premium for 5 Years (ELC)	12,500	2,500	1,250
(8)	given	Assumed Insurance Uptake Rate	50%	75%	100%
(9)	(1)x(7)x(8)	Total Insurance Premium Collected (for 5 Years)	$62,500,000	$18,750,000	$12,500,000
(10)	(1)x(7)	Total Economic Losses (for 5 Years)	$125,000,000	$25,000,000	$12,500,000
(11)	(10)-(9)	Total Uninsured Losses (for 5 Years)	$62,500,000	$6,250,000	$0
(12)	given	Cost of Flood Prevention Scenario (One Time)	$0	$100,000,000	$150,000,000
(13)	(10)+(12)	Economic Cost - based on economic loss (5 Years)	$125,000,000	$125,000,000	$162,500,000
(14)	(11)+(12)	Economic Cost - based on uninsured loss (5 Years)	$62,500,000	$106,250,000	$150,000,000

Sample 1

Based on a 5 year horizon, the option 1 and 2 will have lower cost than option 3 at the same time, the flood insurance participation rate is much higher with option 2, which is a good social effect. Also, think in the longer term, so flood risk mitigation program like this will benefit more, so option 2 should be chosen.

Sample 2

The government should implement option 3, this is because of the high participation ratio, high flood loss return period, and resulting in lower premium. Even though there is a one time cost of infrastructure improvements, it can be financed by charging $X to each insurer.

Sample 3

Out of the three programs, program 3 costs the most, but it costs the least for the government. I would recommend #3 for the reasons:

- Insurers are able to provide coverage based on actuarially sound rates
- Flood return period is the longest amongst the 3, meaning good risk mitigation
- Promotes risk mitigation by the government and insured

EXAMINER'S REPORT

Candidates were expected to be able to evaluate the options from two different perspectives (premium and economic costs).

Common errors include:

- Only evaluating the options from one perspective.
- Not considering inputs, such as frequency and uninsured cost to the society, in the calculation.

QUESTION 11	
TOTAL POINT VALUE: 3.25	**LEARNING OBJECTIVE(S): C1**

SAMPLE ANSWERS

Sample 1

A = Direct Claims and Adjustment Expenses Paid –Current Year
= 0 since the company underwrites property reinsurance only

Incremental Paid Claims (Gross)

Year	12	24	36	48
2013	2,500	5,000-2,500 = 2,500	5,000	1,000
2014	3,700	1,800	3,500	
2015	2,800	3,200		
2016	3,000			

B = Reinsurance Assumed Claims and Adjustment Expenses Paid –Current Year
= Sum of the last diagonal of Incremental Paid Claims (Gross) triangle
= 3,000 + 3,200 + 3,500 + 1,000 = 10,700

Incremental Paid Claims (Net)

Year	12	24	36	48
2013	1,250	2,500-1,250 = 1,250	2,500	500
2014	1,850	900	1,750	
2015	1,400	1,600		
2016	1,500			

D = Net Claims and Adjustment Expenses Paid –Current Year
= Sum of the last diagonal of Incremental Paid Claims (Net) triangle
= 1,500 + 1,600 + 1,750 + 500 = 5,350

C = Reinsurance Ceded Claims and Adjustment Expenses Paid –Current Year
= Sum of the last diagonal of Incremental Paid Claims (Gross) triangle
- Sum of the last diagonal of Incremental Paid Claims (Net) triangle
= (3,000 + 3,200 + 3,500 + 1,000) - (1,500 + 1,600 + 1,750 + 500) = 5,350
or
C = B – D
= 10,700 – 5,350 = 5,350

Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses + Discounting + PFAD (Gross)

Year	12	24	36	48
2013	7,613	12,000-5,000+206 = 7,206	1,536	518
2014	6,395	4,632	1,024	
2015	8,323	5,662		
2016	9,135			

E = Direct Provision for Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses – Current Year
= 0 since the company underwrites property reinsurance only

F = Reinsurance Assumed Provision for Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses – Current Year
= Sum of the last diagonal of Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses + Discounting + PFAD (Gross)
= 9,135 + 5,662+ 1,024 + 518 = 16,339

Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses + Discounting + PFAD (Net)

Year	12	24	36	48
2013	4,167	6,000-2,500+445 = 3,945	841	284
2014	3,500	2,536	561	
2015	4,556	3,099		
2016	5,000			

H = Net Provision for Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses – Current Year
= Sum of the last diagonal of Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses + Discounting + PFAD (Net)
= 5,000 + 3,099+ 561 + 284 -= 8,944

G = Reinsurance Ceded Provision for Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses – Current Year
= Sum of the last diagonal of Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses + Discounting + PFAD (Gross)
- Sum of the last diagonal of Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses + Discounting + PFAD (Net)
= (9,135 + 5,662+ 1,024 + 518) – (5,000 + 3,099+ 561 + 284) = 7,395
or
G = F – H
= 16,339 – 8,944 -= 7,395

I = Net Provision for Prior Year-End
= Sum of the next-to-last diagonal of Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses + Discounting + PFAD (Net) for Accident Year 2015 and prior
= 4,556 + 2,536 + 841 = 7,933

J = Net Amount Paid During the Year for Claims of Prior Years
= Sum of the last diagonal of Incremental Paid Claims (Net) triangle for Accident Year 2015 and Prior
= 1,600 + 1,750 + 500 = 3,850
or

J = D - The last diagonal of Incremental Paid Claims (Net) triangle for Accident Year 2016
= 5,350 - 1,500 = 3,850

L = Net Provision of Prior Years
= Sum of the last diagonal of Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses + Discounting + PFAD (Net) for Accident Year 2015 and prior
= 3,099+ 561 + 284 -= 3,944
or
L = H - The last diagonal of Provision for Unpaid Claims (Including Unreported) and Adjustment Expenses + Discounting + PFAD (Net) for Accident Year 2016
= 8,944 – 5,000 = 3,944

K = Investment Income on Unpaid Claims of Priors Years
= investment yield * mean(I; L)
= 3% * mean (7,933;3,944) = 178

M = Margin (Deficiency)
= I – J + K – L
= 7,933 – 3,850 + 178 – 3,944 = 317

Sample 2

A = 0 since the company underwrites property reinsurance only

B = Cumulative paid from 2016 diagonal (gross) – Cumulative paid from 2015 diagonal (gross)
= (3,000 + 6,000 + 9,000 + 11,000) – (2,800 + 5,500 + 10,000) = 10,700

D = Cumulative paid from 2016 diagonal (net) – Cumulative paid from 2015 diagonal (net)
= (1,500 + 3,000 + 4,500 + 5,500) – (1,400 + 2,750 + 5,000) = 5,350

C = B - D

E = 0 since the company underwrites reinsurance only

F = Gross Ultimate – Gross Paid + Gross Effect of Discounting and PFAD (using 2016 diagonal)
= (12,000 + 11,500 + 10,000 + 11,500) – (3,000 + 6,000 + 9,000 + 11,000) + (135 + 162 + 24 +18)
= 16,339

H = Net Ultimate – Net Paid + Net Effect of Discounting and PFAD (using 2016 diagonal)
= (6,000 + 5,750 + 5,000 + 5,750) – (1,500 + 3,000 + 4,500 + 5,500) + (500 + 349 + 61 + 34)
= 8,944

G = F - H

I = Net Ultimate – Net Paid + Net Effect of Discounting and PFAD (using 2015 diagonal)
= (5,500 + 5,000 + 5,750) – (1,400 + 2,750 + 5,000) + (456 + 286 + 91)
= 7,933

J = Paid for years 2015 and prior (net, 2016 diagonal) – Paid for years 2015 and prior (net, 2015 diagonal)
= (3,000 + 4,500 + 5,500) – (1,400 + 2,750 + 5,000) = 3,850

K = 3% x average [I, L)]
= 3% x average (7,933 ; 3,944) = 178

L = Net Ultimate – Net Paid + Net Effect of Discounting and PFAD (using 2016 diagonal, years 2015 and prior only)
= (5,750 + 5,000 + 5,750) – (3,000 + 4,500 + 5,500) + (349 + 61 + 34) = 3,944

M = I – J + K – L = 7,933 – 3,850 + 178 – 3,944 = 317

EXAMINER'S REPORT

Candidates were expected to know how to:

- Use different information in different types of triangles.
- Fill in schedule 60.30.

Common errors include:

- Assuming the company writes only direct business when the question specifies that the company is a reinsurer.
- Using the Paid triangles as incremental instead of cumulative as specified.
- Not treating Ultimate Claims as undiscounted (incurred claims and IBNR) but as including provisions.
- Not considering discounting and PFAD.

QUESTION 12	
TOTAL POINT VALUE: 3.5	**LEARNING OBJECTIVE: C1**

SAMPLE ANSWERS

Sample answer 1

PV reserve @ 5% = 5,000 x 40% x 1.05^-1 + 5,000 x 35% x 1.05^-2 + 5,000 x 25% x 1.05^-3
= 4,571.86
PV reserve @ 4.5% = 5,000 x 40% x 1.045^-1 + 5,000 x 35% x 1.045^-2 + 5,000 x 25% x 1.045^-3
= 4,611.77
PV reserve @ 4% = 5,000 x 40% x 1.04^-1 + 5,000 x 35% x 1.04^-2 + 5,000 x 25% x 1.04^-3
= 4,652.30
PV reserve @ 3.5% = 5,000 x 40% x 1.035^-1 + 5,000 x 35% x 1.035^-2 + 5,000 x 25% x 1.035^-3
= 4,683.44

PV reserve w/PfAD @ 5% = 4,571.86 + (4,611.77 – 4,571.86) + 4,571.86 x 8% = 4,977.52
PV reserve w/PfAD @ 4% = 4,652.30 + (4,683.44 – 4,652.30) + 4,652.30 x 8% = 5,065.62

- ⇨ Change in Liab = 5,065.62 – 4,977.52 = 88.10

For Assets
HTM:
MV @ 5% = 2,291.30
MV @ 4% = 2,291.30 for H-T-M using book yield, not market yield, so no impact

AFS:
MV @ 5% = 2,020.30
MV @ 4% = 500 x 1.04^-1 + 750 x 1.04^-2 + 1,000 x 1.04^-3 = 2,063.18
Change = 2,063.18 – 2,020.30 = 42.88 flow through OCI

FV options:
MV @ 5% = 4,561.10
MV @ 4% = 2,000 x 1.04^-1 + 1,500 x 1.04^-2 + 1,500 x 1.04^-3 = 4,643.41
Change = 4,643.41 – 4,561.10 = 82.31 flow through NI

- ⇨ NI change = 82.31 – 88.10 = -5.79
- ⇨ OCI change = 42.88
- ⇨ EQ = NI change + OCI change = -5.79 + 42.88 = 37.09

Sample answer 2 (using duration)

Modified Duration of Liabilities= (1 x 5,000 x 40% x 1.05^-1 + 2 x 5,000 x 35% x 1.05^-2 + 3 x 5,000 x 25% x 1.05^-3) / 4,571.86
= 1.82
Change in liabilities = -1.82 x -1% x 4,977.52 = 90.57

Modified Duration of FVO = 1.87
Change in FVO = -1.87 x -1% x 4,561.10 = 85.13

Modified Duration of AFS = 2.19
Change in AFS = -2.19 x -1% x 2,020.30 = 44.28

Change in NI = 85.13 – 90.57 = -5.44
Change in OCI = 44.28
Change in Equity = 44.28 – 5.44 = 38.84

EXAMINER'S REPORT

Candidates were expected to determine the impact that a change in interest rates would have on both the claim liabilities and the various bond portfolio classifications (HTM, AFS, FVO) and how a change in any of these elements would impact income, other comprehensive income and equity.

Common errors include:

- Calculating an increase in net income from an increase in liabilities
- Forgetting to include changes in liabilities in the change in net income
- Assuming that payments occurred mid-year rather than end of year (question specifically stated end of year)
- Calculating a change in the value of HTM bonds and including it the change in net income, OCI or equity
- Forgetting to include claims PfAD in calculation of APV of liabilities

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 13	
TOTAL POINT VALUE: 3.25	**LEARNING OBJECTIVE(S): C2**

SAMPLE ANSWERS

Part a: 1.75 points

i. Investment yield

Invested Assets = Cash + Bonds and Debentures + Common Shares + Real Estate
Beginning Invested Assets = 4,000 + 45,000 + 2,000 + 14,000 = 65,000
Ending Invested Assets = 5,000 + 40,000 + 2,600 + 12,000 = 59,600

Net Investment Income = Investment Income + Realized Gains (Losses) - Investment Expenses
Net Investment Income = 6,000 -1,000 - 500 = 4,500

Investment Yield

$$= \frac{\text{2 x Net Investment Income}}{\text{(Beginning Invested Assets + Ending Invested Assets – Net Investment Income)}}$$

= 2 x 4,500/ (65,000 + 59,600 - 4,500) = 7.5%

ii. Return on Equity

Net Income = Net Earned Premiums - Net Claims and Adjustment Expenses - Total Acquisition Expenses - General Expenses + Net Investment Income - Income Taxes
= 44,000 + 1,200 - 35,000 - 5,000 - 3,000 + 4,500 = 4,200

Return on Equity = Net Income/ Average Equity
= 4,200/[(30,000 + 28,000)/2] = 14.5%
Or
Return on Equity = Net Income/ Ending Equity
= 4,200/30,000 = 14%

iii. Return on Assets

Return on Assets = Net Income/ Average Assets
= 4,200 / [(105,000 + 101,000)/2] = 4.1%

iv. Net Underwriting Leverage Ratio

Net Underwriting Leverage Ratio = Net Premiums Written/Equity
= 44,000/30,000 = 147%

Part b: 1 point

The company is in good financial health for the following reasons:

- The company has a healthy investment yield despite the current low interest rate environment. It may be worth paying closer attention to the company's investment portfolio to better understand its asset classes.
- It has an impressive ROE, which is above the acceptable minimum of 5.4%.

- The return on assets is above MSA's acceptable level of 2.6%.
- Net underwriting leverage ratio is at reasonable level (below the recommended maximum of 300%).

Part c: 0.5 point

Net Leverage Ratio = (Net Written Premium + Net Liabilities)/Equity

Net Liabilities = 260% x 30,000 - 44,000 = 34,000

Total Liabilities = Total Assets – Equity
= 105,000 – 30,000 = 65,000

Net Liabilities = Total Liabilities - Unpaid Claims And Adjustment Expenses Recoverable – Unearned Premiums Recoverable

34,000 = 65,000 - Unpaid Claims And Adjustment Expenses Recoverable – 10,000

Unpaid Claims And Adjustment Expenses Recoverable = 75,000 – 34,000 – 10,000 = 31,000

EXAMINER'S REPORT

Candidates were expected to know how to calculate and use financial ratios to assess the financial performance of a reinsurance company.

Part a

Candidates were expected to know:

- The definition of the ratios
- Which components of Balance Sheet and Income Statement to use to calculate those ratios

A common error made by candidates were to use an incorrect definition of ratios.

Part b

Candidates were expected to know how to interpret the ratios calculated in part a. above.

Common errors include:

- Using an incorrect threshold to assess the financial health
- Answering Yes or No when the question asks for an assessment
- Not commenting on the investment yield

Part c

Candidates were expected to know how to use information provided in the question and calculated in part a. to determine the unpaid claims and adjustment expenses recoverable.

A common error made by candidates was to use an incorrect definition of Net Leverage Ratio.

Some candidates assumed the company had no other assets than those listed in the question and simply subtracted total assets from the assets listed in the question to determine the unpaid claims and adjustment expense recoverable. Candidates who used this approach were expected to state the assumption that the company held no other assets.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 14

TOTAL POINT VALUE: 1.75	**LEARNING OBJECTIVE(S): D1**

SAMPLE ANSWERS

Part a: 1 point

Part i.

- Quantitative/sensitivity analysis
  - Show how profit or loss and equity would have been affected if changes in the relevant risk variable that were reasonably possible at the end of the reporting period had occurred
  - Method and assumptions used in preparing the sensitivity analysis
    OR
  - Any changes from the previous period in the methods and assumptions used

Part ii.

- Qualitative
  - Provide information about terms/conditions of insurance contracts that have a material effect on the amount, timing and uncertainty of the insurer's future cash flows.

Part b: 0.75 point

Any three of the following:

- increasing the tail loss development factors
- increasing the trend rates underlying the calculation of the initial expected loss ratios for the Bornhuetter-Ferguson method
- varying the best estimate by a set percentage
- incorporating the occurrence of a likely adverse event in the evaluation of policy liabilities
- changing the margin(s) for adverse deviations
- using alternative confidence level percentiles
- increasing or decreasing the discount rate / interest rates
- increasing premium written
- increasing unpaid claims
- increasing or decreasing reinsurance coverage

EXAMINER'S REPORT

Candidates were expected to know:

- Disclosure requirements under IFRS 4 for sensitivity to insurance risk
- /Sensitivity approach for disclosing sensitivity to insurance risk
- Qualitative approach for disclosing sensitivity to insurance risk
- Examples of sensitivity tests that could be considered for insurance risk.

Part a

Candidates were expected to provide details on the quantitative/sensitivity and qualitative approach for disclosing sensitivity to insurance risk under IFRS 4.

Common errors include:

- Responding to the question with reference to DCAT or ORSA instead of IFRS 4 disclosure

- Confusing the definitions of qualitative and quantitative
- Providing a partial answer, such as discussing the change in interest rates but failing to mention the resulting impact on assets and liabilities. For example:
    - The risk of loss arising from a change in interest rates
    - Risk of changing interest rates

Part b

Candidates were expected to identify three sensitivity tests that could be considered for insurance risk.

The only common error was to list two tests that were really the same test, such as:

- Increase in unpaid claims
- Decrease in unpaid claims

QUESTION 15

TOTAL POINT VALUE: 2.5 | **LEARNING OBJECTIVE(S): C1**

SAMPLE ANSWERS

Part a: 2 points

(1)	Adjusted Unearned Premium	3,000	2,200
(2)	PV of Loss & LAE	1,764	1,478.4
(3)	PfAD for Claims Development		88.7
(4)	PfAD for Reinsurance		8.57
(5)	APV of Loss & LAE		1,605.67
(6)	Maintenance Expense		75
(7)	EQUP		519.33
(8)	Max DPAE		769.33

(1) = Unearned Premium Booked - Expected Reinsurance Costs
(2) = (1) x Undiscounted LR x Discount Factor
(3) = MfAd for Claims Development x (2)
(4) = MfAD for Reinsurance x [Gross (2) – Net (2)]
(5) = (2) + (3) + (4) + PfAD for Investment Return
(6) = Gross Unearned Premium x Maint Expense %
(7) = (1) – (5) – (6)
(8) = (7) + Unearned Commissions

Part b: 0.5 point

Any of the following:

- No premium deficiency exists, the equity in the unearned premium (EQUP) >0
- No premium deficiency exists, the max DPAE > 0
- No premium deficiency exists, the net unearned premium liability is not greater than the sum of the unearned premium and the unearned reinsurance commission

EXAMINER'S REPORT

Candidates were expected to demonstrate an understanding of premium liabilities, how to calculate the maximum deferred acquisition expenses, and how to determine whether there is a premium deficiency.

Part a

Candidates were expected to calculate the maximum deferred acquisition expenses by demonstrating their ability to calculate the PfADs, the maintenance expense, and the EQUP and Max DPAE.

Common errors include:

- Inconsistent treatment of reinsurance expense: the reinsurance expense could be designated either as an adjustment or as an expense but needed to be treated consistently throughout the candidate's solution.
- Incorrectly applying the reinsurance MFAD to either (i) the gross minus net unearned

premium, or (ii) the undiscounted gross losses minus net losses
- Incorrectly calculating Maintenance Expense from gross unearned premium or by applying the discounting factors

Part b

Candidates were expected to recognize if their solution in part a. indicated a premium deficiency and explain how they came to this conclusion.

Common errors include:
- Relating the Max DPAE to the booked DPAE provided in the question then drawing a conclusion on the premium deficiency
- Not relating the premium deficiency to the Max DPAE but to the DPAE

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 16	
TOTAL POINT VALUE: 1.75	**LEARNING OBJECTIVE(S): C1**
SAMPLE ANSWERS	
Part a: 0.5 point	
Sample 1 The asset for Future income Taxes is the prepayment of tax as a result of the liability deducted for tax purposed being less that the amount reported on the balance sheet. *Sample 2* The asset for Future income taxes represents taxes that are pre-paid due to the fact that the tax credit for losses is less than the actual loss reserve.	
Part b: 1.25 points	
Sample 1 Estimated Effect of Discounting the Asset for Future Income Taxes = (Reported Reserve- 95% of lesser of Reported Reserve and Claim Liability) x Future Income Tax Rate x (1 - Present Value Factor) Present Value Factor = 0.6/(1.05)^0.5 + 0.25/(1.05)^1.5 + 0.1/(1.05)^2.5 + 0.05/(1.05)^3.5 = 0.9486 Actuarial estimate of claim liability < reported reserve : use 816,200 Estimated Effect of Discounting the Asset for Future Income Taxes = (820,000 – 95% x 816,200) x 35% x (1 - 0.9486) = 803.08 *Sample 2 - Alternative payment pattern was also accepted.* Estimated Effect of Discounting the Asset for Future Income Taxes = (Reported Reserve- 95% of lesser of Reported Reserve and Claim Liability) x Future Income Tax Rate x (1 - Present Value Factor) Payment during year x : 810,000 x 0.25/0.4 = 506,250 Payment during year x+1 : 810,000 x 0.1/0.4 = 202,500 Payment during year x+2 : 810,000 x 0.05/0.4 = 101,250 Present Value Factor = (506,250/(1.05)^0.5 + 202,500/(1.05)^1.5 + 101,250/(1.05)^2.5)/810,000 = 0.9529 Actuarial estimate of claim liability < reported reserve : use 816,200 Estimated Effect of Discounting the Asset for Future Income Taxes = (820,000 – 95% x 816,200) x 35% x (1 - 0.9529) = 735.40	

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

EXAMINER'S REPORT
Candidates were expected to demonstrate an understanding of future income taxes in the valuation of policy liabilities.
Part a
Candidates were expected to be able to define the asset for future income taxes. A common error was not knowing the definition.
Part b
Candidates were expected to be able to calculate the effect of discounting the asset for future income taxes. Candidates were expected to identify elements related to the calculation and be able to calculate the present value factor. A common error was to mix up the inputs into the formula for example, using "reported reserve" as the undiscounted estimate instead of the discounted plus PfAD estimate.

QUESTION 17	
TOTAL POINT VALUE: 3	**LEARNING OBJECTIVE(S): C1**
SAMPLE ANSWERS	

Part a: 1 point

Sample 1

"Reasonably Self-Evident" Risk Transfer is when it is intuitively obvious there is a transfer of risk and the insurer is protected against significant adverse financial conditions if an event occurs.

It requires that transactions be 1) done at arms length, and 2) there are risk limiting clauses.

Yes, it does, as earthquake risk is material and can devastate financially, however remote the frequency may be.

Sample 2

If the risk transfer is obvious and apparent by nature and design, if there is substantially all situation, where reinsurer bears all the insurance risk, then no need to probe risk transfer assessment.

May not be suitable here, and depends on the treaty, if proportional then yes. Otherwise, the assuming company bear's a low possibility of losses and if the insured value is low, there is not enough risk for assuming reinsurance, thus it is not self-evident if the treaty is excessive.

Part b: 1 point

Advantage:

Sample 1

Reinsurer would have more data and experience that may help insure to have better pricing and risk analysis.

Sample 2

Information on the reinsurance pricing could be readily available, saving time and cost to derive assumptions from scratch. This could help to alleviate a lack of credibility of the insurer's data.

Disadvantage:

Sample 1

Pricing assumptions may vary if it is soft market or hard market. Risk transfer should not depend on the state of the market.

Sample 2

Risk transfer analysis requires more risk load and less conservative assumptions than the assumption used for pricing. Therefore, there is a need to adjust assumptions for this difference.

Sample 3

Reinsurer pricing assumption may not be suitable for insurer because of different risk aspect, tolerance and nature of business. Their assumption could be too conservative for insurers.

Part c: 1 point

Any four of the following:

- Investment in technology to improve data quality
- Auditing of data by an independent party responsible for collection and coding of data
- Implement contingency plans to ensure claim's handling and adequacy of staff
- Testing the output of models with actual data
- Make sure internal controls exist for manage earthquake exposure
- Management should set guidelines
- Calibrate model parameters
- Use multiple models
- Understand assumptions and limitation of models and seek improvement
- Reconcile input data to ensure accuracy and consistency
- Compare models with industry benchmark
- Manipulate models by qualified staff
- Update models regularly
- Inclusion of non-modelled exposure in the model such as business interruption

EXAMINER'S REPORT

Candidates were expected to demonstrate knowledge of different reinsurance accounting issues and earthquake risk management.

Part a

Candidates were expected to know the concept of "reasonably self-evident" and be able to assess if it applies to a specific situation.

Common errors include:

- Describing risk transfer instead of providing a description of "reasonably self-evident"
- Not providing arguments to support whether or not the treaty is "reasonably self-evident"
- Omitting to discuss the terms of contract to describe the treaty
- Omitting to discuss the assessment of protection to describe the treaty

Part b

The candidates were expected to describe the reinsurance pricing assumptions method.

A common error was not providing enough detail in the answer. For example, simply mentioning "reinsurance pricing assumptions are readily available" did not receive full credit as more detail was required to adequately "describe" the advantage.

Part c

The candidates were expected to be able to identify practices to improve catastrophic risk management.

A common error was providing less than four distinct practices.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 18	
TOTAL POINT VALUE: 2	**LEARNING OBJECTIVE(S): C1**
SAMPLE ANSWERS	

Part a: 1 point

Any two from the following for each:

i. reinsurer:

- Give stability in the report for long tails claim
- free up capital to lower underwriting leverage
- savings in claims adjusting and admin costs
- wish to exit the market
- required after wind-up

ii. insurer:

- suspicious on the creditworthiness of the reinsurer
- decrease expense cost
- expect more favorable loss development than planned
- more efficient to handle claims themselves
- receive a cash flow right away

Part b: 1 point

Any two from the following for each:

i. financial

- amount and timing of cash flows or payment pattern
- discount rate used
- cost inflation
- potential for volatility in cash flows
- income tax
- credit risk
- claim development
- mismatch between assets and liabilities
- cost of capital

ii. non-financial

- mortality of the claimants
- current and future entitlements of the claimants or latent claims
- unfavorable court decisions
- legal environment change
- tort reform

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

EXAMINER'S REPORT
Candidates were expected to demonstrate knowledge of reinsurance commutations.
Part a
Candidates were expected to describe reasons to commute from both an insurer's and a reinsurer's perspective. A common error was reversing the reasons to commute between insurer and reinsurer.
Part b
Candidates were expected to describe considerations associated with future cash flows of a commutation. Common errors include: • Not providing answers to the non-financial portion of the question. • Providing financial considerations as non-financial considerations.

QUESTION 19	
TOTAL POINT VALUE: 2.75	**LEARNING OBJECTIVE(S): C1, C2, D1**

SAMPLE ANSWERS

Part a: 2.25 points

Sample answer

Countrywide PML 500
= [80,000^1.5 + 300,000^1.5] ^ (1/1.5)
= 326,946

East Canada PML 420
= 0.68 x 80,000 + 0.32 x 20,000
= 60,800

West Canada PML 420
= 0.68 x 300,000 + 0.32 x 120,000
= 242,400

Canada-wide exposure
= 326,945 x 2/8 + 242,400 x 6/8
= 263,536

Reinsurance coverage
= 0% x 25,000 + 50% x 25,000 + 90% x 100,000 + 100% x 100,000 + 0% x 13,536
= 202,500

10% Capital and surplus
=0.1(55,000 + 175,000 + 40,000)
= 27,000

ERC
= 263,536 – 202,500 –27,000 – 0 – 0
= 34,036

Earthquake reserve
= (0 + 34,036)1.25
= 42,545

Part b: 0.5 point

Sample answer 1

Take the maximum between your property exposure net of deductible from the east or west.

Sample answer 2

Max(East Canada, West Canada) of Total Insurance to Value minus retention/deductible

Sample answer 3

Could use the approach of Max(East PTIV – deductible; West PTIV – deductible) where PTIV = Property Total Insured Value

EXAMINER'S REPORT

Candidates were expected to demonstrate knowledge of earthquake reserves as outlined in the MCT guideline and in the CCIR instructions.

Part a

Candidates were expected to understand how to calculate an insurance company's earthquake reserves. The MCT guideline explains that the total earthquake reserves need to be multiplied by 1.25 but do not adequately explain how the reserves should be accounted for in page 20.45 and 20.20 of the P&C Return; thus, calculations both including and excluding multiplication by 1.25 were accepted.

Common errors include:

- Using PML 250 rather than PML 420 for calendar year 2016
- Missing AOCI in the equity calculation
- Failing to determine the reinsurance amount, equity and ERC
- Not applying the 10% charge to equity
- Failing to identify that the total earthquake reserve = EPR + ERC and that EPR = 0

Part b

Candidates were expected to understand how earthquake reserves should be determined for companies that do not use models.

Common errors include:

- Stating that the approach should use models or stochastic models, an answer which was explicitly excluded by the question
- Responding with just the TIV without stating maximum of east and west, or net of deductible

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 20	
TOTAL POINT VALUE: 2	**LEARNING OBJECTIVE(S): C2**
SAMPLE ANSWERS	

Part a: 0.5 point

Sample answer 1

- Interest rate risk is the risk associated with a shift in the market yield curve and its resulting impact on the values of assets and liabilities

Sample answer 2

- Interest rate risk is the risk arise from change of market value which could have impact on assets and liabilities

Part b: 0.5 point

Sample answer 1

- Effective duration accounts for situations where the cash flows may change as a result of changes in interest rates. Modified duration does not.

Sample answer 2

- Effective = $\frac{V^- - V^+}{2 \times V_0 \times \Delta y}$

- Modified duration $= \frac{1}{1+\text{Yield}} \times \frac{\Sigma\, t \times PVCF_t}{\text{Market Value}}$

Part c: 1 point

Sample answer 1

- Asset = 900*4.75*1.25% + 50*25*125% + 50*3*125% = 70.9375
- Liab = 500*2.5*125% + 100*2.75*125% = 19.0625
- 70.9375 – 19.0625 = 51.875

Sample answer 2

- Duration of rate sensitive assets = (900 x 4.75 + 50 x 25 + 50 x 3)/1000 = 5.675
- Duration of rate sensitive liabilities = (500 x 2.5 +100 x 2.75)/600 = 2.542
- Effect of 125 bp increase = Max (1000 x 5.675 x .00125 – 600 x 2.542 x .0012,0) =51.87
- Effect of 125 bp decrease = Max (1000 x 5.675 x- .00125 – 600 x 2.542 x -.0012,0) = 0
- Margin required = Max (51.87,0) = 51.87

EXAMINER'S REPORT

Candidates were expected to know:

- The definition of interest rate risk
- The difference between effective and modified duration
- How to calculate the capital (margin) required for interest rate risk

Part a

Candidates were expected to define interest rate risk, identify that it relates to loss from market changes in interest rates, and understand the relationship between changing interest rates and the value of assets and liabilities.

Common errors include:

- Not mentioning the relationship to assets or liabilities
- Stating that interest rate risk causes a mismatch between assets and liabilities

Part b

Candidates were expected to know the difference between effective duration and modified duration.

Common errors were providing an incorrect definition or formula for these items.

Part c

Candidates were expected to be able to calculate the duration of interest rate sensitive assets and liabilities and margin required for an interest rate shock.

A common error was not applying the 125 basis point shock factor.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 21	
TOTAL POINT VALUE: 2.25	**LEARNING OBJECTIVE(S): C1**

SAMPLE ANSWERS

Sample answer

DCAT => 95th - 99th percentile => test 40% decline => 90,000 (0.4) = ↓36,000

=> CA = 100,000 – 36,000 = 64,000
CR ins. risk unchanged =20,000
CR cr. risk unchanged = 5,000
CR eq risk = 27000 – 0.3 (36,000) = 16,200
CR int. rate risk unchanged = 2,000
CR op risk = 5000 – 0.085 (0.3(36,000)) = 4,082
A = 5,000 + 16,200 + 2,000 = 23,200
I = 20,000
=> Div Cr = 23,200 + 20,000 – $[23{,}200^2 + 20{,}000^2 + 23{,}200\ x\ 20{,}000]^{0.5}$ =5,754
=> CR = A + I + op risk – Div Cr = 41,528
=> MCT = 64,000 / (41,528 / 1.5) = 231%

∴MCT impact = 231% - 287% = -56%

EXAMINER'S REPORT

Candidates were expected to select an appropriate DCAT percentile scenario and adjust the components of the MCT accordingly.

Common errors include:

- Using an incorrect percentile scenario
- Not adjusting for operational risk
- Not adjusting for diversification credit
- Not dividing capital required by 1.5 before calculating the MCT ratio

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 22	
TOTAL POINT VALUE: 2.25	**LEARNING OBJECTIVE(S): C1**

SAMPLE ANSWERS

Part a: 0.75 point

Sample 1

1) It's not appropriate as stress testing is a control tool to identify risks, with the purpose of complementing other risk management tool, supporting capital management and improving liquidation management. Only consider insurance risk ignores the potential effects of other risks, which could be significant
2) Change: consider credit and market risks as well

Sample 2

Not appropriate because there might by some interactions, dependencies with other risks that could be detected if all material and relevant risks are considered. Because of this, suggested change is to include all material and relevant risks in stress testing

Sample 3

Not appropriate. Earthquake could also impact the capacity of the insurer to operation adequately. The stress test should also incorporate operational risk

Part b: 0.75 point

Sample 1

That approach is not appropriate; although earthquakes happen very infrequently, they can have devastating effects on a book of business. The company cannot rely on the fact that they haven't had an earthquake to predict future risk. Given lack of data, they should get external data and/or models to better asses their risk exposure & consider it

Sample 2

Not Appropriate
As in earth prone area, and earthquake risk has accumulated as no earthquake before, it's important to include this scenario
Include this scenario and test it effect on insurer surplus

Part c: 0.75 point

Sample 1

i. Insurance risk and market risk may be related as an earthquake may incur significant claims on the insurer, as well as significant losses on its real estate portfolio.
ii. Insurance risk and liquidity risk may be related as an earthquake may incur significant claims on the insurer, requiring the insurer to pay. However, if much of the insurer's portfolio is in real estate, the insurer may not be able to sell earthquake-damaged property quickly.
iii. New business risk and market risk may be related as an economic recession in the area can impact the value of the real estate investment, as well as growth of the insurer's book of business.

The insurer can invest in real estate in a different region. This way the insurer should be able to still enjoy high returns on its investment, yet avoid adverse interactions between risks.

EXAMINER'S REPORT

Candidates were expected to demonstrate a basic understanding of the purpose and application of stress testing.

Part a

Candidates were expected to understand that a primary purpose of proper risk management is to assess risks that may not seem material at first. Insurance risk may be the most sizable risk for an insurance company. It is not the only risk.

A common error was not explicitly stating whether or not the approach was "appropriate" or not.

Part b

Candidates were expected to understand that an insurer's internal experience is not credible for evaluating exposure to low-frequency events and devise approaches, such as using a stochastic model with industry data, to form the complement.

A common error was not explicitly stating whether or not the approach was "appropriate" or not.

Part c

Candidates were expected to understanding interactions between risks and how an effective stress testing program would reveal these.

The most common error was mistaking concentration of risk for an interaction. If the book is concentrated, the concentration is a point of consideration for insurance risk. If the portfolio is concentrated, the concentration is a point of consideration for market risk. The concentration is the risk, not the interaction. Concentration simply exacerbates the concentration.

Another common error was not explicitly stating whether or not the approach was "appropriate" or not.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 23	
TOTAL POINT VALUE: 3.25	**LEARNING OBJECTIVE(S): C2**
SAMPLE ANSWERS	

Part a: 0.5 point

Any two of the following:

- Market volatility that leads to a decline in market value of the investment portfolio
- Increase in interest rate, which decrease market value of fixed-income securities
- Concentration of asset class with high risk of default
- Material amount of foreign investment in a particular investment category
- Important recession that would greatly affect the value of equities
- Default risk from bond issuers that suddenly increases

Part b: 1 point

- Credit risk (any one of the following):
  - Capital charges are applied to different receivable balances to reflect 3rd party default/counterparty risk.
  - Reflect the risk that insurer is unable to collect recoverables from reinsurer
  - Reflect the risk that insurer is unable to collect recoverables from agents and brokers
  - Reflect the risk that insurer is unable to collect recoverables from policyholders
  - Reflect the risk that insurer is unable to collect recoverables from residual markets

- Underwriting risk or Insurance risk (any one of the following):
  - Capital charges are applied to loss and loss adjustment expense reserves and net premium written
  - Reflect the pricing risk inherent in a company's mix of business
  - Reflect any excessive growth in premium or exposure
  - Reflect the risk inherent in a company's loss reserve

Part c: 0.5 point

Sample answers include the following:

- Adjustment to reflect the fact that individual risk components will not likely to develop simultaneously
- Adjust for the diversification between risk categories
- Credit because risk categories are not independent

Part d: 0.25 point

Sample answers include the following:

- A.M. Best stress a company's BCAR score for a second Catastrophic event
- The purpose is test how sensitive a company's balance sheet strength is to a second catastrophic event
- Determine the impact on surplus of multiple catastrophic events

Part e: 1 point

Sample answer:

- Company B has more access to capital as a publicly traded company.
- Company B has a more diversified book of business so may have less volatility
- Company B is not exposed to frequent catastrophic event that which can lead to accumulation losses. Earthquake is less subject to occur multiple times.
- So company B is more likely to be allowed to fall below the BCAR Guidelines.

EXAMINER'S REPORT

Candidates were expected to demonstrate knowledge of the A.M. Best rating system.

Part a

Candidates were expected to list two examples that could lead to an increase in capital charges for investment risk in the A.M. Best rating system such as scenarios that were related to fixed income securities, equities, or interest rates.

A common error was to inverse the effect. For example:

- A decrease of interest rate will decrease the market value of fixed-income securities

Another common error was to only provide an example but not describe the scenario that would lead to an increase in capital charges. For example:

- A decline in market value of the investment portfolio

Part b

Candidates were expected to identify and describe credit risk and underwriting or insurance risk.

Common errors include:

- Stating items related to the MCT such as operational risk.
- Only providing the risk but not the description.

Part c

Candidates were expected to briefly describe the purpose of the square root rule.

There were no common errors.

Part d

Candidates were expected to describe the purpose of the A.M. Best natural catastrophe stress testing.

A common error was not stating the purpose is to test how sensitive a company's balance sheet strength is to a second catastrophic event.

Part e

Candidates were expected to use the information provided to determine which company would have the authorization of A.M. Best to fall below the BCAR Guidelines. To get full credit, 3 keys items needed to be discussed: financial flexibility, historical volatility assumed by the

diversification of line of business, and exposure to frequent seasonal events.

Common errors include:

- Answering that company A would be more likely to fall below the BCAR guidelines. The question asked candidates to determine which company would be more likely to have A.M. Best authorization to fall below the BCAR guidelines.
- Not discussing each of financial flexibility, historical volatility and exposure to frequent seasonal events.

QUESTION 24	
TOTAL POINT VALUE: 5	**LEARNING OBJECTIVE(S): C2, D1**

SAMPLE ANSWERS

Part a: 1.5 points

Sample answer

Let M = market risk

Operational risk
= 8.5% x CR_0 + 2.5% x P_W + 1.75% x P_A + 2.5% x P_C
= 8.5% x (21,000+M+2,500) + 2.5% x (90,000+182,000) + 1.75% x (2,000+5,000) + 2.5% x (3,000+11,000)
= 8.5% x M + 9,270

Diversification credit
$= A + I - \sqrt{A^2 + I^2 + 2RAI}$
= M + 2,500 + 21,000 - $\sqrt{(M + 2{,}500)^2 + 21{,}000^2 + 2\ x\ 0.5\ x\ (M + 2{,}500)\ x\ 21{,}000}$
= M + 23,500 - $\sqrt{M^2 + 26{,}000M + 499{,}750{,}000}$

An early warning intervention from OSFI would occur when MCT falls below 150%.

$$\frac{53{,}000}{\{\mathrm{M} + 2{,}500 + 21{,}000 + 0.085\mathrm{M} + 9{,}270 - [M + 23{,}500 - \sqrt{M^2 + 26{,}000M + 499{,}750{,}000}]\} / 1.5} < 150\%$$

$53{,}000 < 0.085\mathrm{M} + 9{,}270 + \sqrt{M^2 + 26{,}000M + 499{,}750{,}000}]$

$(43{,}730 - 0.085\mathrm{M})^2 < \mathrm{M}^2 + 26{,}000\mathrm{M} + 499{,}750{,}000$

Solve for M:
$0.992775\mathrm{M}^2 + 33{,}434\mathrm{M} - 1{,}412{,}562{,}900 > 0$

$\mathrm{M} = \frac{-33{,}434 \pm 82{,}020}{1.98555} = 24{,}470$

Part b: 1.5 points

Sample answers for (i)

- Deducted from capital available to the extent amounts receivable and recoverable from unregistered reinsurers are not covered by collateral (non-owned deposits, letters of credit)
- Deducted from capital available if unearned premiums, outstanding losses recoverable and receivables from assuming insurer exceed the amount of payables, non-owned deposits and letters of credits held

Sample answers for (ii)

- Credit risk impacted by higher counterparty default risk
- Collateral amounts subject to risk charges
- Excess collateral will decrease capital required for credit risk

Sample answer for (iii)

- Both credit risk and insurance risk will be impacted, which impacts operational risk
- CR_0 portion of operational risk will be impacted since insurance risk and credit risk are both impacted by unregistered reinsurance
- Impacts the amount of premium ceded, which impacts operational risk

Part c: 1 point

Any 4 of the following:

- ORSA considers more risks than MCT and includes all risks material and relevant to the company
- ORSA takes into account dependencies and correlations between risks whereas MCT uses a simplified approach that only considers correlation between insurance and asset risk
- ORSA includes assessment of internal controls to allow for better management of the business
- ORSA allows for the setting of an internal target to reflect an insurer's own risk appetite
- ORSA allows for a better qualitative assessment of risk, whereas MCT is only quantitative
- ORSA is tailored to a company's own risk profile, whereas MCT is a formula-based approach that is not specific to the company

Part d: 1 point

Any 2 of the following:

- Peer reviewer reviews for reasonableness of assumptions and methodologies used by the AA. External auditor ensures that financial statements are free from material misstatement.
- External auditor ascertains the quality of data used by the AA; peer reviewer is not required to verify data.
- Peer reviewer not required to perform any recalculations, whereas an external auditor must do so
- Peer reviewer reviews work at a more granular level and provides feedback to the AA which is a source of professional education. External auditors do not have this responsibility.
- Peer reviewer ascertains that AA's work is done in accordance to CIA standards. External auditor evaluates financial statements based on generally accepted accounting principles.

EXAMINER'S REPORT

Candidates were expected to understand the components of the MCT calculation and how these components are impacted by unregistered reinsurance. Candidates were also expected to be able to describe the benefits of ORSA and contrast the responsibilities of an external peer reviewer and external auditor.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

Part a

Candidates were expected to understand the individual components of the MCT calculation.

Common errors include:

- Using an incorrect formula for diversification credit.
- Calculating operational risk and diversification credit but not performing required algebraic manipulation to solve for market risk.

Part b

Candidates were expected to understand how unregistered reinsurance impacts capital available, credit risk, and operational risk.

Common errors include:

- Not including sufficient detail – for example, stating that unregistered reinsurance deducts capital available but not stating why it results in a deduction.
- Including only one point for each subpart of part b. – for example, stating that operational risk is impacted by credit risk, rather than stating that operational risk is impacted by credit risk and also insurance risk.

Part c

Candidates were expected to describe the benefits of ORSA over MCT.

Common errors include:

- Listing fewer than four benefits of ORSA.
- Providing benefits that were too similar – for example, stating that ORSA is tailored to an insurer's own risk profile and also stating that ORSA allows risks specific to the company to be considered.
- Stating that ORSA is reviewed by the board and/or management, whereas MCT is only reviewed by the actuary. This an untrue statement as the MCT is not reviewed in isolation by the actuary.

Part d

Candidates were expected to contrast the responsibilities of the external peer reviewer and the external auditor.

Common errors include:

- Providing only one point of contrast.
- Separately listing points specific to an external peer reviewer and an external auditor, without providing insight on how their responsibilities differ.
- Switching the responsibilities of each. For example, stating that the peer reviewer is required to perform recalculations while the auditor is not.
- Not describing a specific responsibility. For example, stating that peer review occur every 3 years whereas audits are on an annual basis.

QUESTION 25	
TOTAL POINT VALUE: 2.5	**LEARNING OBJECTIVE(S): D1**
SAMPLE ANSWERS	

Part a: 1 point

Ranges

- Claims development: from 2.5% to 20%
- Investment return rates: from 25 to 200 basis points

Situations outside the range (two of the following, one related to claims development and one related to investment return rates):

- Lower if the company is in runoff and all cashflows have been commuted. No uncertainty in either the amount nor the timing of payment
- When there is a stop loss agreement in place and the claim liabilities are booked at the stop loss limit
- If the insurer's portfolio yield is less than 25 bps
- Very long duration of claims (third party bodily injury) with significant changes to regulatory (product reforms/judicial case)
- For unusual uncertainty arose or if PfAD would be too small due to the fact that MfAD as a % of BE is unusually low
- Can be above if there is huge uncertainty as shown by stochastic method
- If new company, with high volatility expected & long-tail may choose claims MfAD > 20%
- New company, inexperienced claim handling department
- New insurer with very low credibility of data may want to use very high margin
- In a new line of business with very uncertain claim development
- If claim department is severely understaffed
- If it's longer tail line of business or lack of credible data, MfAD could be greater than 20%
- Economic meltdown where there is no liquidity of asset values. Return is difficult to estimate.
- If investment market are entering recession like in 2008, may choose MfAD > 200bps
- Investment return rate MfAD may be higher in periods of hyperinflation where risk of not being able to meet obligations
- Insurer with very aggressive investment strategies
- The default of equities, derivatives or dramatic changes in investment strategies can cause out of range MfAD
- Insurer mainly invest in high yield equities
- Can be selected higher if the majority of the portfolio is volatile (low-grade shares for example)
- If the volatility of interest rate is very big
- Can be less than 0.5% if invest in government bond or risk free bonds where the risk is minimal

- Can be higher when recent credit downgrade for invested company. May be in default soon.
- Can be outside if there is a very significant mismatch between asset and liability durations
- Can be selected outside this range if regulations restrict the interest rate that can be used
- Can be outside if large event such as CAT has happened increasing uncertainty
- When investment risks are fully hedged

Part b: 1 point

Four of the following from any combination of categories:

Claims management category

- Systems affecting claims handling procedures
- Claims management leadership and personnel
- Adequacy of staffing
- Guidelines for claims handling
- Procedures for/philosophy regarding opening claims, minor claims, major claims, defending claims, closing claims, claims expenses
- Procedures for establishing case outstanding
- Relative adequacy of case outstanding

Underwriting category

- Systems affecting underwriting
- Underwriting leadership and personnel
- Adequacy of staffing
- Guidelines for underwriting

Other category

- Technology and processing systems
- Internal controls
- Accounting systems
- The better the management, the lower the margin
- Risk management

Part c: 0.5 point

Two of the following:

- Mismatch risk between payment of claims and availability of liquid assets,
- Error in estimating the payment pattern of future claims, and
- Asset risk including credit/default risk and liquidity risk.
- Interest rate risk: risk of losses on financial volatility of assets due to changes in interest rates
- Economic risk (high volatility in market) – economic recession hits and rates are more subject to volatility
- Timing risk of liabilities – the risk of claim payment will be paid faster than expected, pat out period shortened.

- Concentration risk – portfolios that are strongly concentrated in specific market or type of asset can exacerbate the effect of market fluctuations
- Reinvestment risk – if the duration of liability is longer than duration of asset may need to reinvest asset at lower rate
- Foreign exchange rate risk: risk of loss due to its volatility of foreign exchange rates
- Risky/aggressive investment strategy with high volatility
- Market risk / Equity risk – volatility found in equity investments / stock price fluctuation

EXAMINER'S REPORT

Candidates were expected to know the considerations involved in selecting MfADs.

Part a

Candidates were expected to know the ranges of MfAD and to identify one situation in each case where MfAD outside of the range is acceptable.

Common errors include:

- Stating a situation where a company is in runoff or has reinsured all its risks but not mentioning that all remaining treaties are commuted for an MfAD below the range. There is still default risk if the treaties are not commuted.
- Identifying structured settlement as a scenario with an MfAD below the range. There is still default risk in this situation.

Part b

Candidates were expected to know the considerations related to an insurance company's operations when selecting claims development MfAD. Acceptable considerations related to claims management, underwriting, IT, or system risk, because these considerations are operationally related.

Common errors include:

- Stating considerations related to data as these considerations are not operationally related. For example: data is sparse.
- Stating considerations related to line of business as these considerations are not operationally related. For example: an insurer enters a new line of business.

Part c

Candidates were expected to know the risks that investment return rate MfAD addresses.

There were no common errors; the answers are straight from the MfAD reading.

QUESTION 26

TOTAL POINT VALUE: 1.75	**LEARNING OBJECTIVE(S): D1**

SAMPLE ANSWERS

Part a: 0.75 point

Three of the following:

- Method of valuing the assets
- Allocation of those assets among line of business
- Return on assets at the balance sheet date
- Yield on assets acquired after balance sheet date
- Yield on assets acquired after the calculation date
- Investment expenses
- Credit risk
- Default risk
- Gain and losses from assets sold after balance sheet date

Part b: 1 point

Sample responses for positive net cash flow include the following:

- Need to consider the reinvestment rate of the new money and need to consider the company's investment strategy
- Reinvest those positive net cash flows. Consider what would be the market interst rate when we need to reinvest those assets
- Extra will be reinvested, reinvested assets could have lower rates

Sample responses for negative net cash flow include the following:

- Need to consider the expected future cash flow of the payments from liabilities / claims, need to consider the liquidity of the assets, and consider capital gains or losses from premature liquidation of assets.
- Liquidate some assets to meet the obligation. Consider the gains / losses realized on the sale of those assets
- Difference will be made up by liquidating assets. Bonds that are not mature are forced to sell would yield a lower return than otherwise.

EXAMINER'S REPORT

Candidates were expected to know the considerations in the selection of discount rate and know how to address the situations of positive and negative net cash flow.

Part a

Candidates were expected to know the considerations to determine the discount rate.

Common errors include:

- Stating considerations related to selecting interest rate MfAD, such as volatility of market changes
- Stating considerations that are general but not specific to discount rate, such as market environment, market condition, economic condition

- Stating considerations related to the estimated of undiscounted claim liabilities, such as payment pattern

Part b

Candidates were expected to know how to address the situations of positive and negative net cash flow.

Common errors include only stating the action without description. For example:

- reinvesting positive cash flow
- liquidate assets to address negative cash flow

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 27

TOTAL POINT VALUE: 2.25	**LEARNING OBJECTIVE(S): D1**

SAMPLE ANSWERS

Part a: 0.75 point

Any three of the following:

- Event provides information related to the entity as it was at calculation date
- Event retroactively makes the entity different at calculation date
- Event makes entity different after calculation date and purpose of work is to report entity as it was after event
- Event happened before the calculation date
- It's an adjusting event that reflects a situation at the end of the reporting period.
- Adjusting event that changes entity as it was prior to valuation date (discovered between valuation date and report date)

Part b: 1.5 points

Sample response for Scenario i.

- This is not a subsequent event since the actuary first became aware of it after the report date. This event is data defect and system error. Therefore the actuary should reflect this event into the work, withdraw or amend the report.

Sample responses for Scenario ii.

- The occurrence of the winter storm and actuary's acknowledge both are between the calculation date and report date. Therefore it is a subsequent event. However, the event made the entity different after the calculation date and the purpose of the work is to report it on the entity as it was. Also this event may have an impact on premium liabilities, but is not material. Therefore the actuary needs to disclose this event in the note of the report, but not reflect event in the work.
- If material, disclose in annual statement. Not an adjusting event, will be reported for next report. If not material, no action needed (recommend disclosing to auditor)

Sample response for Scenario iii.

- This event is not a subsequent event. But if it were a subsequent event, it would be reflected in the report because it has materially affected on unpaid claims due to the high proportion of auto business in that province. This event invalidated the report. So the actuary needs to withdraw or amend the report.
- Made aware after the report date. However, as it fundamentally changes the underlying business, the AA should assess the materiality of the change to determine whether an amendment is necessary
- It is an adjusting event and 50% of business will be affected. (Assume the reform will impact all claims, future & inforce claims) so modify the report.

EXAMINER'S REPORT

Candidates were expected to understand what a subsequent event is, when it needs to be account for, and apply the understanding to a real life situation.

EXAM 6C SPRING 2017 SAMPLE ANSWERS AND EXAMINER'S REPORT

Part a

Candidates were expected to understand what a subsequent event is and know when a subsequent event needs to be accounted for. Candidates were expected to distinguish whether the event will impact the entity before or after the calculation date.

Common errors include:

- Stating the action the Appointed Actuary should take. This was not asked in this part.
- Providing a definition of subsequent event. This was not asked.
- Stating the event will make the entity different without mentioning whether it will impact the entity before or after the calculation date.
- Stating the event is material without mentioning whether the impact is before or after calculation date.
- Simply stating data error. This does not demonstrate an understanding of subsequent event.

Part b

Candidates were expected to apply the understanding of subsequent events to a real life situations. Candidates needed to identify an action the Appointed Actuary should take and justify the action.

A common error for scenario i. was not mentioning in the justification that it is a data defect.

A common error for scenario ii. was not mentioning whether the impact is before or after the calculation date in the justification.

A common error for scenario iii. was not stating there is material impact on the entity but not mentioning that the impact was retroactive.