17. (3 points)

The following information is available for a federally regulated property and casualty insurance company as at December 31, 2018.

Exceedance probability curves:

Percentile	West Canada	East Canada
0.995	30,000	12,000
0.996	75,000	25,000
0.998	350,000	100,000
0.999	600,000	200,000

Reinsurance program:

Loss Layer	% Ceded
100,000 xs 50,000	50%
150,000 xs 150,000	100%

The following information is also available:

- The insurance company is phasing-in to the countrywide PML 500 requirement.
- No capital market financing is used by the company.
- The total capital & surplus of the company is 400,000.
- The company will use the maximum allowed of its capital & surplus to determine the earthquake reserves.
- The Earthquake Premium Reserve (EPR) is 25,000.

a. (2.5 points)

Calculate the earthquake reserves as at December 31, 2018.

b. (0.5 point)

Identify two elements that earthquake exposure risk management policies and procedures should document.

QUESTION 17	
TOTAL POINT VALUE: 3	**LEARNING OBJECTIVE(S): C1, C2**
SAMPLE ANSWERS	
Part a: 2.5 points	

Sample 1

East Canada PML 500 < West Canada PML 500 and East Canada PML 250 < West Canada PML 250
so East Canada PML 420 < West Canada PML 420

West Canada PML 420 = 0.68 * West Canada PML 500 + 0.32 * West Canada PML 250
= 0.68 * 350 000 + 0.32 * 75 000 = 262 000

Countrywide PML 500 = (East Canada PML 500$^{1.5}$ + West Canada PML 500$^{1.5}$)$^{1/1.5}$
= (100 000$^{1.5}$+350 000$^{1.5}$)$^{1/1.5}$ = 384 784

Countrywide PML 2018 = Countrywide PML 500*(2018-2014)/8 + max(East Canada PML 420, West Canada PML 420)*(2022-2018)/8
= 384 784 * 4/8 + 262 000 * 4/8 = 323 392

Financial resources = capital & surplus allocated to EQ + EPR + reinsurance coverage + capital market financing = 400 000 * 10% + 25 000 + (100 000 * 50% + 150 000) + 0 = 265 000

Earthquake Reserves = (Countrywide PML 2018 – Financing resources + EPR) * 1.25
= (323 392 – 265 000 + 25 000) * 1.25 = 104 240

Sample 2

East Canada PML 420 = 0.68 * East Canada PML 500 + 0.32 * East Canada PML 250
= 0.68 * 100 000 + 0.32 * 25 000 = 76 000

West Canada PML 420 = 0.68 * West Canada PML 500 + 0.32 * West Canada PML 250
= 0.68 * 350 000 + 0.32 * 75 000 = 262 000

Countrywide PML 500 = (East Canada PML 500$^{1.5}$ + West Canada PML 500$^{1.5}$)$^{1/1.5}$
= (100 000$^{1.5}$+350 000$^{1.5}$)$^{1/1.5}$ = 384 784

Countrywide PML 2018 = Countrywide PML 500*(2018-2014)/8 + max(East Canada PML 420, West Canada PML 420)*(2022-2018)/8
= 384 784 * 4/8 + 262 000 * 4/8 = 323 392

Financial resources = capital & surplus allocated to EQ + EPR + reinsurance coverage + capital market financing = 400 000 * 10% + 25 000 + (100 000 * 50% + 150 000) + 0 = 265 000

ERC = Countrywide PML 2018 – Financial resources = 323 392 – 265 000 = 58 392

Earthquake Reserves = (ERC + EPR) * 1.25 = (58 392 + 25 000) * 1.25 = 104 240

Part b: 0.5 point
Sample 1   • Nature and adequacy of financial resources   • Identification and assessment of PML factors   *Sample 2*   • The risk appetite and the risk tolerance of the company   • The data management framework   *Sample 3*   • Document model assumptions, methods and limitation   • Document data management   *Sample 4*   • Calculation of PML factors   • Contingency plans supporting the risk   *Sample 5*   • Monitoring of concentration of exposures   • Models limitation and non-modelled risks
EXAMINER'S REPORT
Candidates were expected to demonstrate knowledge of the earthquake reserve calculation and earthquake exposure risk management policies and procedures documentation.
Part a
Candidates were expected to know how to calculate the earthquake reserves.   Common errors included: • Not adding the EPR into the financial resources   • Misestimating the PML 500 and PML 250 part of the PML 420 calculation
Part b
Candidates were expected to identify two elements that the earthquake exposure risk management policies and procedures should document.   A common error included: • Describing only one element