8. (1.75 points)

An insurer sells coverage with an attachment point of 5,000 and a layer limit of 5,000. The following table represents the expected cumulative severity distribution and limited expected severity for the current year at various limits:

l	F(l)	E[X;l]
4,545	0.842	1,807
5,000	0.859	1,875
5,500	0.875	1,941
9,091	0.938	2,256
10,000	0.947	2,308
11,000	0.954	2,357

The actuary expects a 10% severity increase for all claim sizes next year.

a. (0.75 point)

Calculate the percent change in frequency of claims in the layer.

b. (1 point)

Calculate the percent change in pure premiums in the layer.

CONTINUED ON NEXT PAGE

QUESTION 8

TOTAL POINT VALUE: 1.75 | **LEARNING OBJECTIVE(S): B1**

SAMPLE ANSWERS

Part a: 0.75 point

Sample 1

Current Layer Frequency = F(10,000)-F(5,000) = 0.947 – 0.958 = 0.088

Future Layer Frequency = F(10,000/1.1) – F(5,000/1.1) = 0.938 – 0.842 = 0.096

% Change Frequency = 9.09%

Sample 2

$$t_n = \frac{S\left(\frac{a}{t}\right)}{S(a)} = \frac{S(4545)}{S(5000)} = \frac{1-.842}{1-.859} = 1.12 \quad => 12.1\%$$

Part b: 1 point

Sample 1

$$Current\ Layer\ Severity = \frac{E[X;10000]-E[X;5000]}{F(10000)-F(5000)} = \frac{2308-1875}{0.088} = 4920$$

$$Future\ Layer\ Severity = \frac{1.1(E[X;9091]-E[X;4545])}{F(9091)-F(4545)} = \frac{1.1(2256-1807)}{0.096} = 1.1 \times 4677 = 5145$$

$$\%\ Change\ severity = \frac{5145}{4920} - 1 = 4.57\%$$

$$\%\ Change\ PP = (1+0.099)(1+0.0457) - 1 = 14.06\%$$

Sample 2

$$t_s = \frac{t(E[X;10000/1.1]-E[X;5000/1.1])}{E[X;10000]-E[X;5000]} - 1 = \frac{1.1(2256-1807)}{2308-1875} - 1 = 14.06\%$$

Sample 3

$$Current\ Layer\ Severity = \frac{E[X;10000]-E[X;5000]}{1-F(5000)} = \frac{2308-1875}{1-.859} = 3070.9$$

$$Future\ Layer\ Severity = \frac{1.1(E[X;9091]-E[X;4545])}{1-F(4545)} = \frac{1.1(2256-1807)}{1-.842} = 3125.9$$

$$\%\ Change\ severity = \frac{3125.9}{3070.9} - 1 = 1.8\%$$

$$\%\ Change\ PP = (1.121)(1.018) - 1 = 14.1\%$$

SAMPLE ANSWERS AND EXAMINER'S REPORT

EXAMINER'S REPORT

Candidates were expected to apply frequency and severity distributions to determine expected losses by layer.

Credit was given for 2 interpretations of "claims in the layer":

1. All the losses above 5,000
2. Only the losses that fell in the layer 5,000 to 10,000

Part a

Candidates were expected to calculate the effect of inflation on the frequency.

Most candidates were able to calculate this correctly and received full marks. A common mistake was multiplying by the trend factor (1.1).

Part b

Candidates were expected to calculate the effect of inflation on the severity and pure premium.

Common mistakes included:

- Multiplying the pure premium trend by the frequency trend
- Forgetting to multiply the severity trend by the frequency trend
- Forgetting to multiply the future layer severity by the trend factor (1.1)