11. (1.75 points)

Given the following loss distribution for accident year 2015 by policy limit:

Size of Loss	$100,000 Limit		$250,000 Limit		$500,000 Limit	
	Claims	Losses ($000)	Claims	Losses ($000)	Claims	Losses ($000)
X <= $100,000	210	14,000	40	3,000	50	3,000
$100,000 < X <= $250,000			50	9,000	40	7,000
$250,000 < X <= $500,000					10	4,000
Total	210	14,000	90	12,000	100	14,000

a. (1 point)

Calculate the increased limits factor for $250,000 assuming a basic limit of $100,000.

b. (0.25 point)

Assume a ground-up annual severity trend of 10% applies to the data above. Briefly discuss how the increased limits factor estimate would change for future accident years without performing any additional calculations.

c. (0.5 point)

Calculate the complement of credibility for the excess layer between $250,000 and $500,000 using the industry increased limits factors below.

Limit of Liability	Increased Limits Factor
$100,000	1.00
$250,000	1.50
$500,000	1.90
$750,000	2.25
$1,000,000	2.50

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QUESTION 11

TOTAL POINT VALUE: 1.75 | **LEARNING OBJECTIVE(S): A8**

SAMPLE ANSWERS

Part a: 1 point

Sample 1

LAS(100,000) = [14,000 + 3,000 + 3,000 +(50 + 40 + 10)(100)]*1000 / (210+90+100) = 75,000

LAS (150,000 ex. 100,000) = [9,000,000 + 7,000,000 – (50+40)(100,000) + 150,000(10)] / (50+40+10) = 85,000

Pr(X>100,000) = (50 + 40 + 10) / (90 + 100) = .526

LAS(250,000) = 75,000 + .526(85,000) = 119,737

ILF = 119,737 / 75,000 = 1.60

Sample 2

(14,000,000 + 3,000,000 + 50*100,000 + 3,000,000 + 50*100,000) / (210 + 90 + 100) = 75,000

[9,000,000 – 50*100,000 + 7,000,000 – 40*100,000 + 10*(250,000 – 100,000)] / 190 = 44,737

ILF = (75,000 + 44,737) / 75000 = 1.5965

Part b: 0.25 point

- The trend would have a greater impact in the excess layers because losses already at limit would get the full trend in the excess and those just under would be pushed into the excess layer. Since the excess would be increasing faster than the basic, the ILF would increase.
- The factor given in part (A) will be too low because excess loss trend is greater than the trend for losses confined to the basic limit.
- The increased limits factor would increase since the excess trend will be larger than the ground up trend.
- The ILF estimate would increase in future years due to the leveraged effect of the severity trend on higher limit losses.
- B/L Trend < Ground Up < XS Trend
  LAS(250K) will increase more than LAS(100K) due to the trend properties listed above and thus the ILF will increase.

Part c: 0.5 point

Sample 1

Utilize lower limits analysis since we know the losses capped at 100,000 for all policies and it is the most stable given the small volume of data for all policies. It does however have a lower logical relationship to the losses between 250 and 500

= losses capped at 100 * (1.9 – 1.5) / 1.00

= 30,000,000 * (1.9 – 1.5) / 1.00

= 12,000,000

Sample 2

Losses capped at 250,000 = [3,000 + 9,000 + 3,000 + 7,000 + 10(250)]*1,000 = 24,500,000

24,500,000 [(1.9 – 1.5) / 1.5] = 6,533,333

EXAMINER'S REPORT

Candidates were expected to calculate an increased limits factor using censored data, as well as demonstrate an understanding of how trend impacts excess layers and how to incorporate industry data.

Parts a. and b. of this question were relatively straightforward, while part c. was challenging. Some candidates performed well on this question, while others struggled to fully answer the question or complete the calculations.

Part a

Candidates were expected to calculate an increased limits factor using censored data. This included calculating limited average severities for $100k and estimating the LAS for $250k by calculating the average claim size within the $100k to $250k layer and adding to the calculated LAS($100k)

Common mistakes included:

- Using the shortcut for calculating the LAS ($250k) and then applying the probability of a claim being greater than $100k. This essentially double counted the probability.
- Using capped losses instead of Limited Average Severities
- Including claim counts from policies with $100K policy limits when estimating the average size of claims in the $100-$250k layer.
- Calculating the LAS($250k) from all policy limits similar to the calculation for LAS($100k)

Part b

Candidates were required to understand the impact of trend on excess layers and explain that due to leveraged trend, ILF would increase over time.

Common mistakes included:

- Commenting on impact of trend, but failing to indicate how the ILF would change.
- Stating that the ILF would increase more than 10% (this is not true)
- Indicating there would be no change to the LAS(100K)
- Noting that the ILF would increase without discussing why.

Part c

Candidates were required to estimate a complement of credibility for the layer $250k x/s $250k. This involves generating a ratio from the industry ILFs for the layer and applying to capped losses from the experience.

The text states that for Increased Limits analysis, the actuary uses this "method when data is available for ground-up losses through the attachment point (i.e. losses have not been truncated at any point below the bottom of the excess layer being priced)." This would suggest that data from policy limits of $250k and $500k could be used for this method.

For Lower Limits analysis, data from all policy limits should be used for the above reasons.

The question did not explicitly state the expected method to use, which proved challenging for candidates.

Common mistakes included:

- Calculation of the capped losses from experience
    - Using LAS instead of total capped losses.
    - Using $100k policy limits experience for Increased Limits analysis to estimate capped losses at $250k.
    - Using just the losses from the corresponding policy limit.
    - Using the size of the layer or attachment point ($250k or $100k)
- Attempting to use the Limits Analysis method of calculating the complement of credibility. There was not enough information given in the question to use this method.
- Attempting to estimate the ILF from the experience (similar to part a.).
- Estimating a Decreased Limits Factor (attachment point of $500k). The question specifically asked for an ILF complement.
- Estimating the complement for the layer $250k x/s $500k.