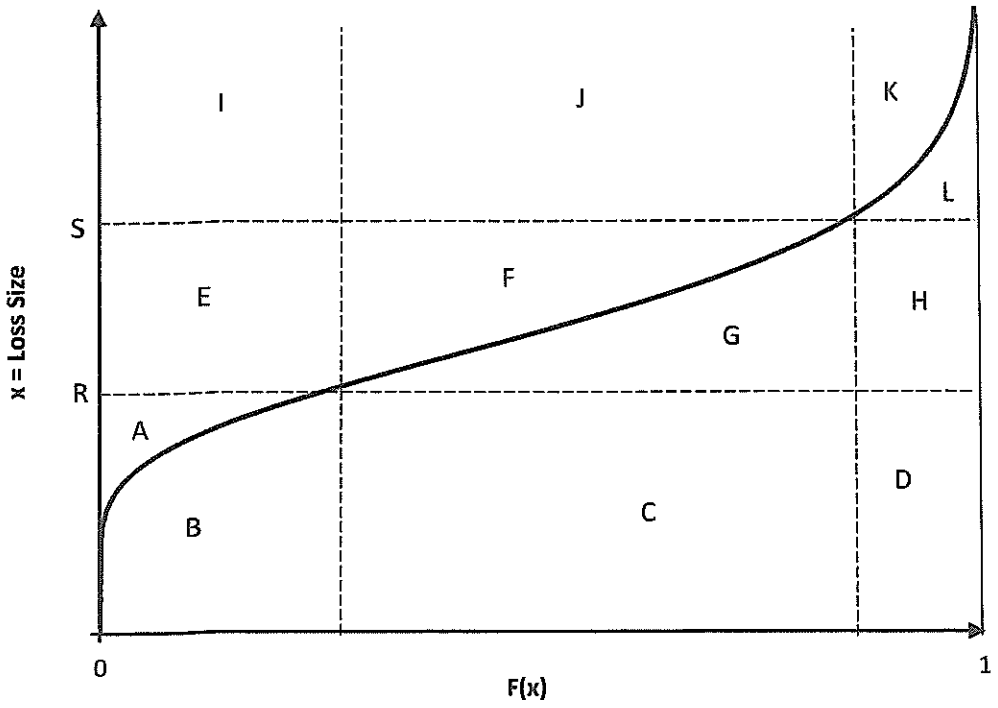
7. (2 points)

The following Lee diagram applies to a cumulative size of loss distribution F(x), where letters A through L represent the areas of the enclosed regions.



a. (0.25 point)

Express the area G + H in integral form, using the layer method.

b. (0.25 point)

Express the area B + C + D in integral form, using the size method.

c. (0.25 point)

Assume R is the basic limit. Express the increased limits factor for limit S algebraically using the area labels provided in the graph.

d. (1.25 points)

Describe the consistency test for increased limit factors. Use a graph to explain what the consistency test is evaluating. Label all relevant features of the graph.

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QUESTION 7

Total Point Value: 2.00 **Learning Objective: C5**

Sample Answers

Part a: 0.25 points

Sample 1

$$\int_R^S G(x)dx$$

where $G(x) = 1 - F(x)$

Sample 2

$$\int_R^S S(x)dx$$

Part b: 0.25 points

Sample 1

$$\int_0^R xf(x)dx + R\ (1 - F(R))$$

Sample 2

$$\int_0^R xdF(x) + R\ (1 - F(R))$$

Part c: 0.25 points

Sample 1

$$\frac{G + H + B + C + D}{B + C + D}$$

Sample 2

$$\frac{B + C + D + G + H}{B + C + D}$$

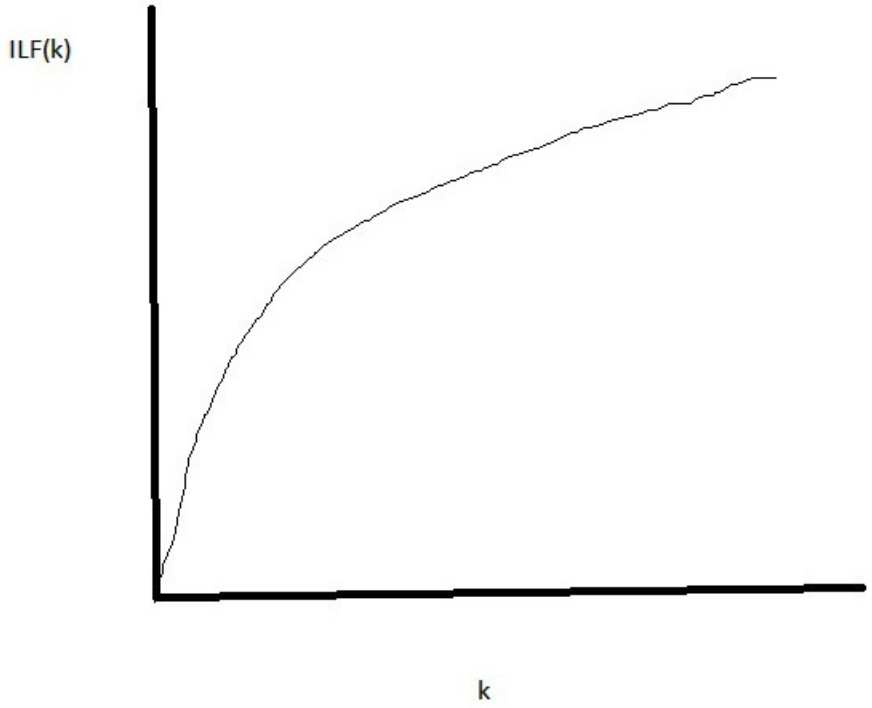
Part d: 1.25 points

Sample 1

The first derivative of the ILF is positive. ILF' >= 0

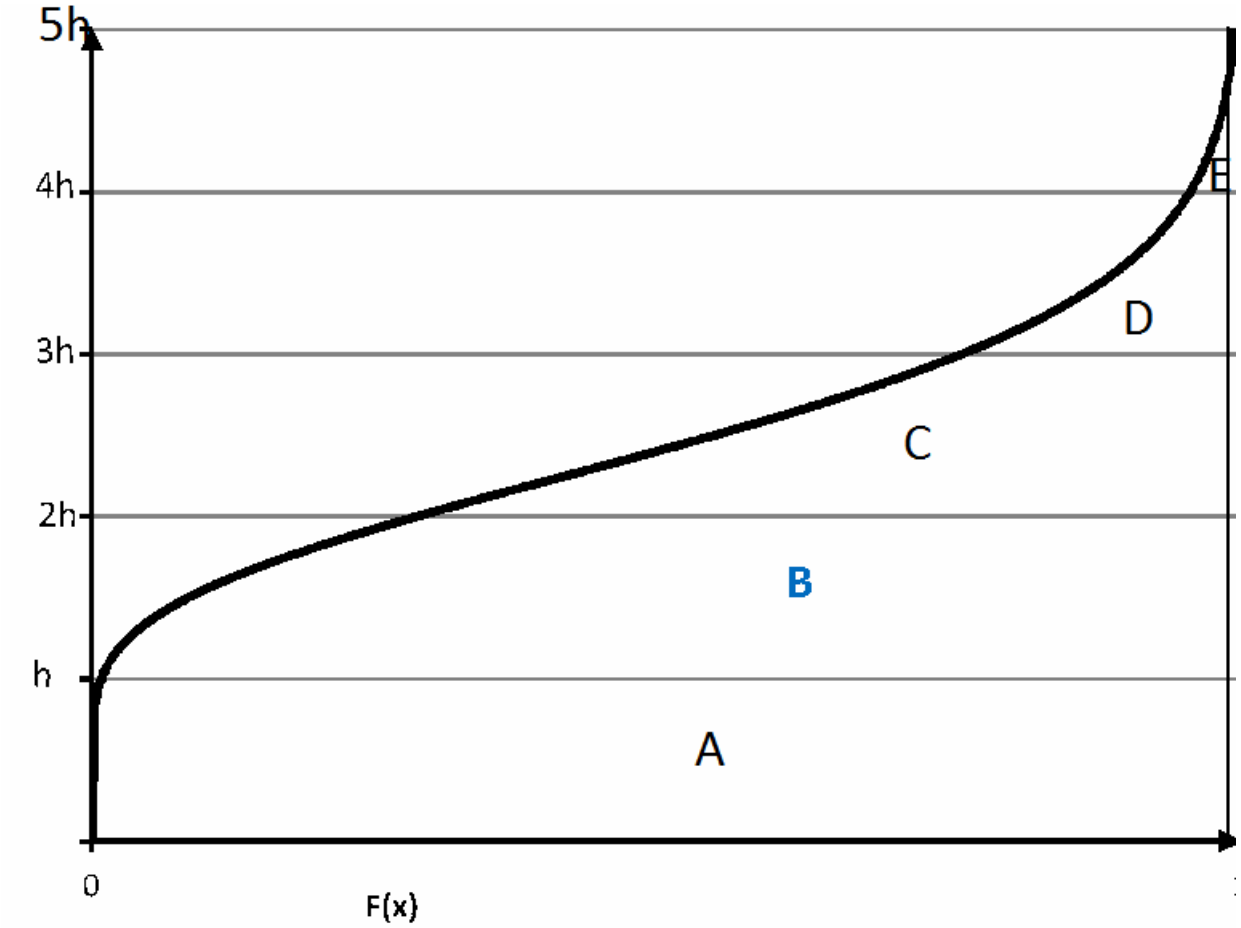
Second derivative is negative. ILF'' <= 0

ILFs increase @ a decreasing rate and thus approach a constant -> see graph below



The consistency test evaluates whether the marginal change is increasing @ a decreasing rate. The graph above shows as the limit, k, grows, the ILF increases but @ a decreasing rate

Sample 2



For constant size of intervals (height h), each successive layer is smaller than layer below it. E < D < C < B.

As one adds additional coverage, the probability of reaching higher layer is lower so marginal cost of layer is cheaper. This is why ILFs should increase at a decreasing rate, which is checked by the consistency test. Marginal cost of layer decreases with higher layers.

Examiners Report

Part a:

Most candidates performed well on this question. There was no partial credit given for this subpart given the point value. The most common error is the confusion/understanding of the definition of G(x) and F(x).

Part b:

Candidates struggled on this part of the question.. There was no partial credit given for this subpart given the point value. The candidates who missed this question mostly did not know how to set up an integral of the area tested using the size method. Some candidates got area B set up correctly and missed the equation for areas C and D.

Part c:

Most candidates performed well on this question. There is no partial credit given for this subpart given the point value. The most common error was to include area L in the numerator of the equation.

Part d:

Most of the candidates did very well stating/explaining the consistency test and got the full portion of credit for this part of the response. Some candidates lost points on the remainder of the partial credit for not fully connecting the consistency theory back to the graph. Also some candidates provided an explanation that was in the right direction but some facts were not stated correctly or accurately. For example, some candidates had equations of the marginal increase in ILF setup incorrectly/incompletely, or the description of the areas under the curve were unclear. If no explanation was given for the graph presented (tying back to the consistency theory), then some partial credit was deducted, but credit was still given for the presentation of the graph. Some candidates did not have the correct labels for the x and y axes of the graph, or the labels were switched which made the shape of the graph incorrect. When the labels were switched, very often the explanation was incorrect also, and thus the candidate lost some points as well.

QUESTION 8