13. (1.75 points)

A cohort of policies has a loss elimination ratio of $k = 0.1$.

a. (1 point)

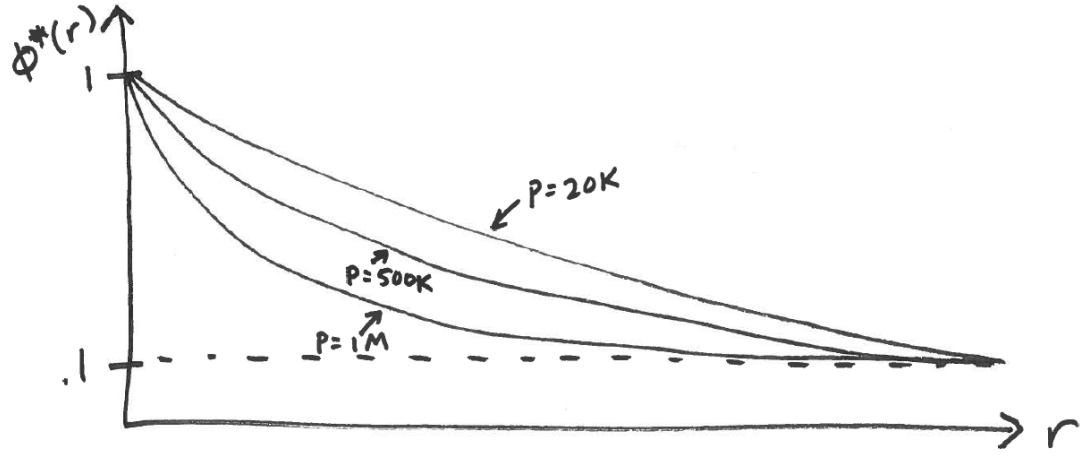
Draw a graph with three curves showing the relationship between the Table L charge (y-axis) and the entry ratio (x-axis) for policies with premiums of $20,000; $500,000; and $1,000,000.

b. (0.75 point)

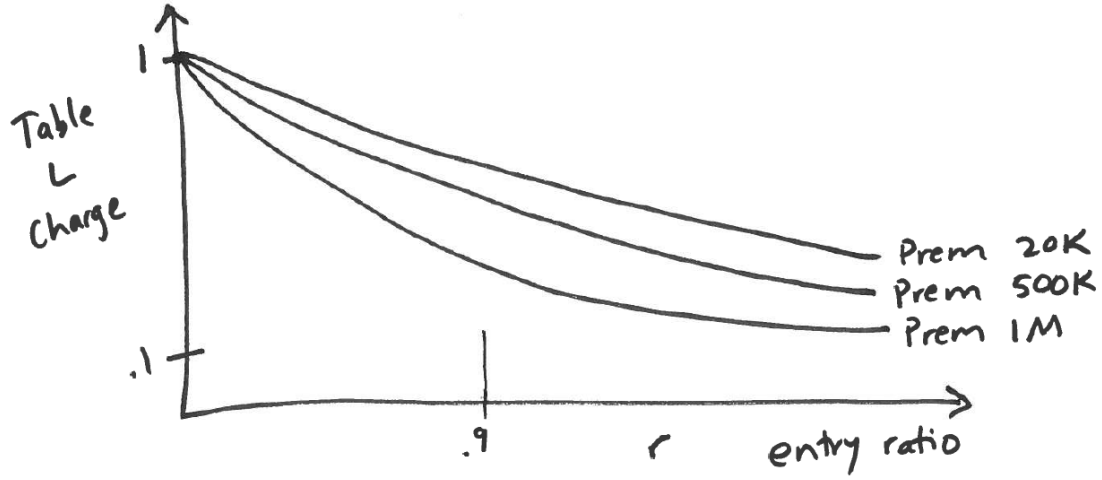
Briefly explain three main features of the curves that describe their proper relationship to the axes and to each other.

Question 13:

Part a
Model Solution 1



Model Solution 2



Part b
Model Solution 1

1. Lower premium amounts have a higher charge for a given entry ratio.
2. No charge goes below LER of 0.1.
3. Φ*(0) = 1 for all premium levels, and charge gradually approaches LER as entry ratios increase.

Model Solution 2

1. $\Phi^*(0) = 1$
2. $\Phi^*(\infty) = k$
3. $\Phi^{*\prime}(r) < 0$

Examiner's Comments:

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This item asked candidates to draw a graph showing the Table L charges for a number of policies at different entry ratios and then describe the features of that graph. Since both parts are related, candidates' scores for parts a and b were often correlated. The result is that many candidates either did very well or very poorly on this item.

For both parts of this item, the most common error was reversing the order of the curves. Many candidates answered that, for a given entry ratio, the Table L charge for a larger policy was larger than that of a smaller policy. Many candidates made this mistake both in drawing the graph for part a and describing the features of the graph in part b.

Other common errors included:

- not starting all curves at an entry ratio of zero and a Table L charge of one;
- not reflecting that the curves asymptotically approach the loss elimination ratio;
- and not reflecting that the curves should be concave up (or convex).

For Part b, candidates were asked to supply three features. Many correct solutions included some variation of the items in the following list:

- For a fixed premium size, the charge is a decreasing function of entry ratio.
- For a fixed premium size, the charge approaches k as the entry ratio increases.
- For a fixed premium size, the charge approaches 1 as the entry ratio approaches 0.
- For a fixed entry ratio, the charge approaches 1 as the premium size approaches 0.
- For a fixed entry ratio, the charge decreases as premium increases.
- For an entry ratio of 0, the charge equals 1.
- As premium increases, the Table L charge approaches k if $r \geq 1-k$, and 1-r if $r < 1-k$.

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