14. (4 points)

An insured has a large dollar deductible (LDD) policy. Total losses and ALAE limited to the deductible are distributed uniformly on the interval [0, 400,000], and total unlimited losses and ALAE are distributed uniformly on the interval [0, 800,000].

- The insured currently has an aggregate loss limit of $300,000.
- Credit risk is not contemplated in pricing.
- The deductible applies to both loss and ALAE.

The following expenses apply to this insured:

Expense Item	Value	Applies to
ULAE	7.5%	Loss & ALAE
Loss Based Assessments	5%	Loss & ALAE
Overhead	$45,000	Fixed
Acquisition	6%	Written Premium
Commission	12.5%	Written Premium
Premium Tax	4%	Written Premium
Profit and Contingency	-5%	Written Premium

a. (2 points)

Calculate the LDD premium for this insured.

b. (2 points)

It is later determined that, although the distribution of total unlimited losses and ALAE remains unchanged, the total losses and ALAE limited to the deductible actually follow the following distribution:

- 75% probability of loss and ALAE between $0 and $300,000
- 25% probability of loss and ALAE between $300,000 and $700,000
- Losses follow a uniform distribution within each range.

Use one or more Lee diagrams to demonstrate the impact to the premium for the LDD policy.
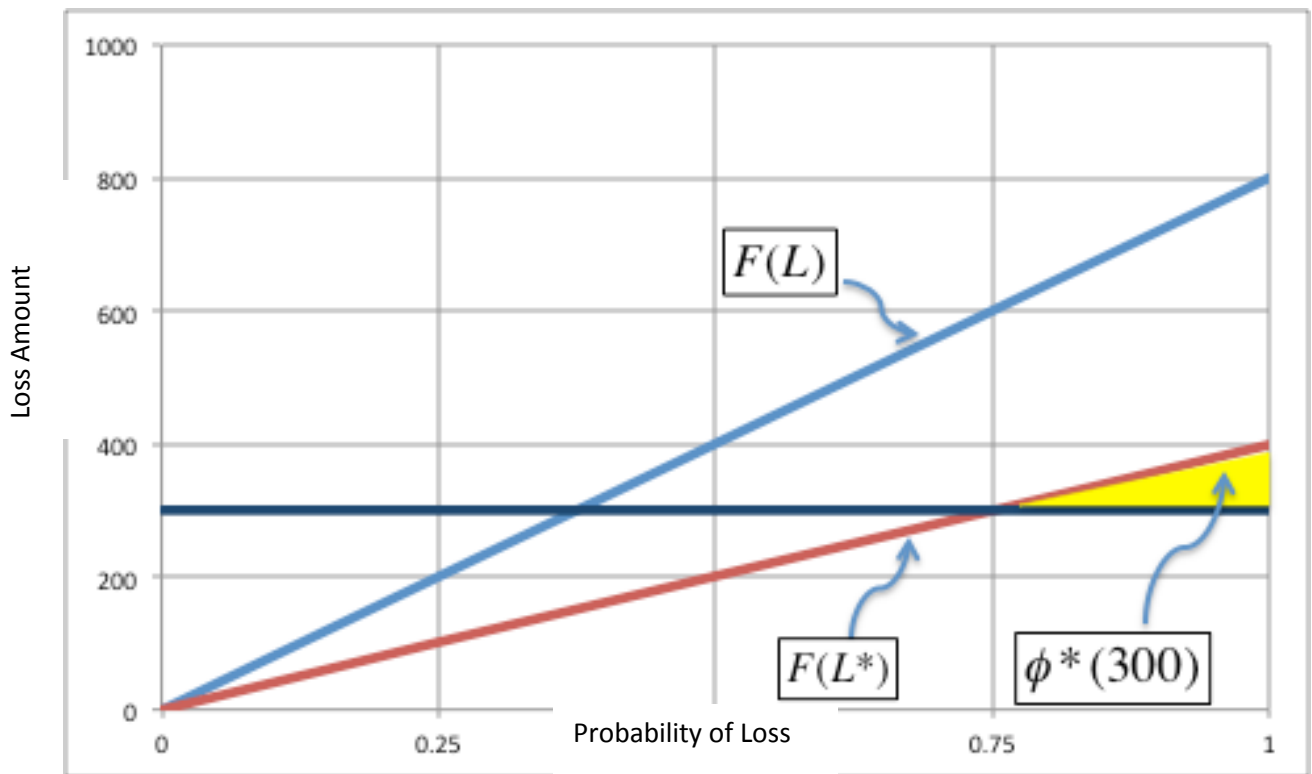
QUESTION 14

Total Point Value: 4.00   **Learning Objective: B2a, B7a&b**

Sample Answers

Part a: 2.00 points

(in $000)

Let L = total loss, and L^* = loss limited to deductible

Then $E[L] = 400$ and $E[L^*] = 200$, meaning $XS = 400 - 200 = 200$

Draw a Lee diagram to get the insurance charge:
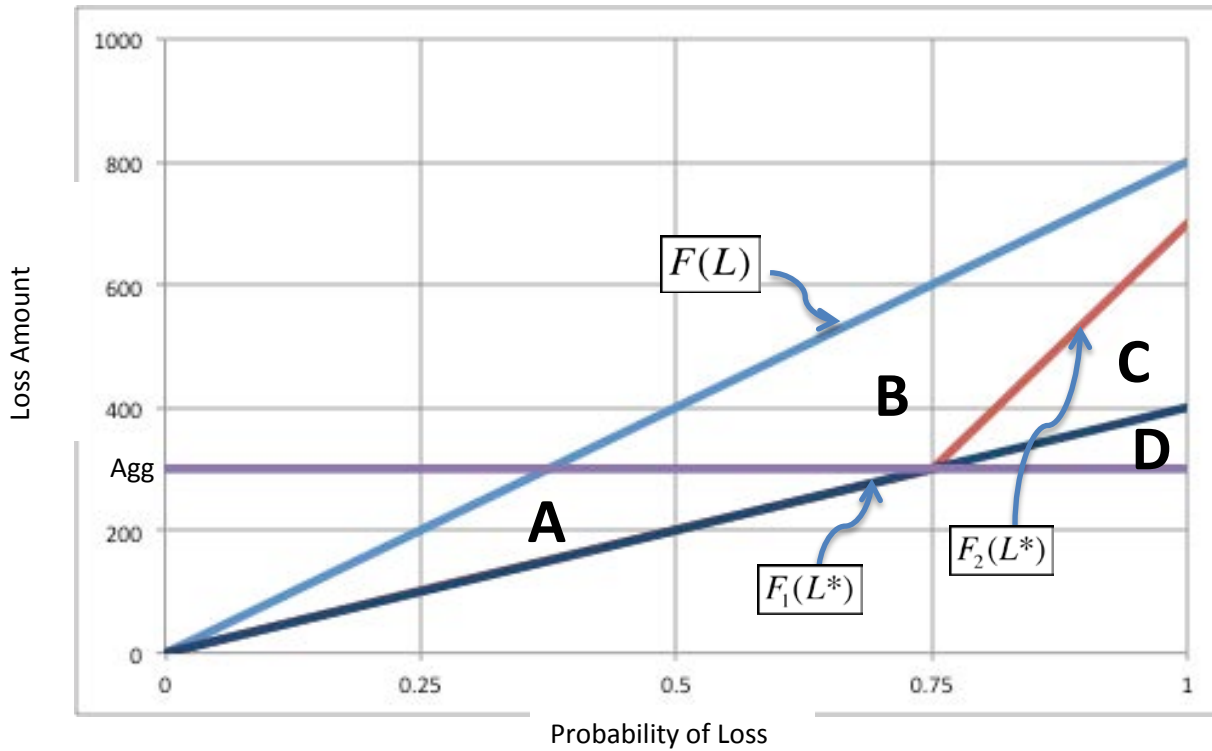

$$\phi^*(300) = (.5)(.25)(100) = 12.5$$

$$LDD = \frac{200 + 12.5 + 400(.075 + .05) + 45}{1 - .06 - .125 - .04 + .05} = 372.727 \rightarrow \$372,727$$

Loss retained by the insured $= (.5)$

Part b: 2.00 points

Sample 1:

Loss cost under old distribution = Excess Loss + Insurance Charge
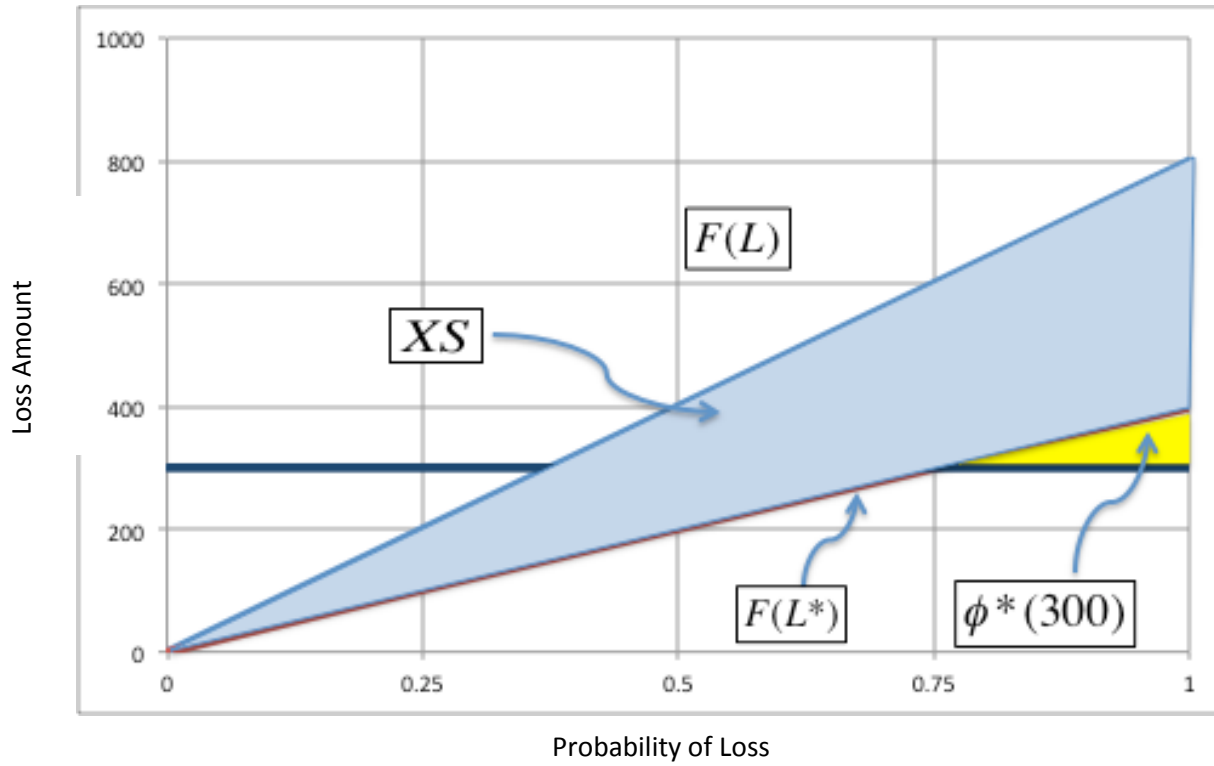
$$=(A+B+C)+D$$

Loss cost under new distribution = Excess Loss + Insurance Charge
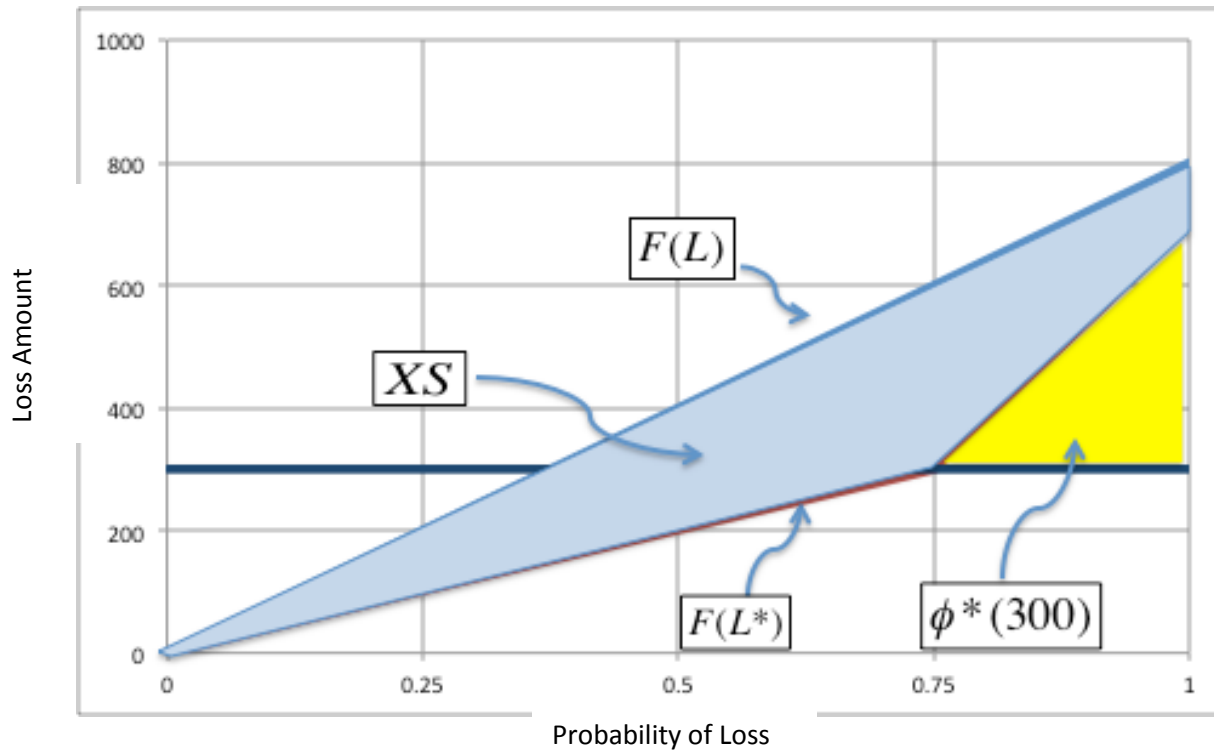
$$=(A+B)+(C+D)$$

Since loss costs are equal and expenses don't change, no change in LDD premium.

Sample 2:

Recall from Part a that expected loss cost is $200,000 + $12,500 = $215,000

New insurance charge = $(.5)(.25)(700{,}000 - 300{,}000) = 50{,}000$

Expected unlimited loss (same as Part a) = 400,000

New expected limited loss = $(.5)(.75)(300{,}000) + (.25)(300{,}000) + 50{,}000 = 237{,}500$

New expected excess loss = expected unlimited – expected limited

$$= 400{,}000 - 237{,}500 = 162{,}500$$

New expected loss cost = expected excess + insurance charge

$$= 162{,}500 + 50{,}000 = 212{,}500$$

Since expected loss cost didn't change, expenses won't change, so same LDD premium.

Examiners Report

Part a:

Notes:

- Candidates were not required to draw a Lee Diagram for Part a.
- Several candidates calculated the limited expected loss ($187,500), and subtracted this from the total expected loss to get the Table L charge of $212,500. This was an equivalent approach to the above, and received full credit.
- A few candidates assumed that (per Teng) the 12.5% commission was included in the 6% acquisition, but this doesn't make mathematical sense. The A term in Teng's formula for LDD premium should include both the 6% and 12.5% as a total acquisition cost.
- Where candidates included the insurance charge in the formula, but then failed to calculate the charge, partial credit was still given for the numerator.

Common Errors:
- Applying ULAE and LBA percentages to limited or excess losses (instead of unlimited expected loss).
- Using limited expected loss as the expected loss cost in the numerator of the LDD premium formula.
- Separating fixed expense as an additive amount at the end instead of putting it in the numerator.
- Not including the insurance charge as part of the loss cost.
- Trying to use NCCI's Table M and the ICRLL procedure to calculate the insurance charge instead of calculating directly based on the given loss distributions.
- Where candidates developed the insurance charge as a percent of limited expected loss, several then misapplied that percentage to unlimited expected loss.

Part b:

Notes:

- The intent of the question was to produce a graphical demonstration that the LDD premium wouldn't change. Candidates who recalculated the excess and/or insurance charges for Part b were given credit **only** if these were accompanied by an accurate Lee Diagram **and** were calculated correctly.
- If a candidate produced a Lee Diagram for Part a, they didn't need to reproduce that graph for Part b in order to get credit for the original limited distribution or the unlimited distribution.
- Some candidates used the entire area of the Table L charge for their demonstration, which received full credit.
- Some candidates recalculated not only the expected loss cost, but the premium as well. If calculated correctly, this was still worth full credit.

Common Errors:

- Several candidates didn't accurately produce a graph of the new limited distribution.
- Many candidates who didn't produce a graph of the total loss distribution also failed to identify the new excess losses. Likewise, many candidates who didn't produce the aggregate limit line also failed to identify the new insurance charge.
- A common error was to identify only one change in either the excess loss or the insurance charge, but not both; or to identify both changes, but to fail to correctly identify that they completely offset each other, or comment at all on the impact to premium.