6. (2 points)

Given the following information:

Amount of Loss	Probability of Loss
$0	80%
$100,000	15%
$500,000	5%

- The basic limit is $200,000.
- The actuary selects 20% of the standard deviation as the risk load.
- Assume there are no expenses.

Calculate the risk-loaded increased limit factor for a policy limit of $400,000.

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Question 6:

Model Solution 1

ILF will be equal to $\frac{E[g(x;k)]+.2(stddev\ g(x;k))}{E[g(x;b)]+.2(stdev\ g(x;b))}$

$E[g(x;400k)] = .15(100k) + .05(400k) = 35{,}000$
$E[g(x;400k)^2] = .15(100k^2) + .05(400k^2) = 9.5B$
$std\ dev = \sqrt{9.5B - (35000)^2} = 90{,}967.027$
$risk\ load = .2(90967.027) = 18193.4054$

Similarly:
$E[g(x;200k)] = .15(100k) + .05(200k) = 25000$
$E[g(x;200k)^2] = .15(100k^2) + .05(200k^2) = 3.5B$
$std\ dev = \sqrt{3.5B - (25000)^2} = 53619.026$
$risk\ load = .2(53619.026) = 10723.81$
$ILF = \frac{35000 + 18193.405}{25000 + 10723.81} = 1.489$

Model Solution 2

Basic Limit
$E[L] = (.80)(0) + .15(100{,}000) + .05(200{,}000)$
$= 25{,}000$
$E[L^2] = (.80)(0) + .15(100{,}000^2) + .05(200{,}000^2)$
$= 35\ x\ 10^8$
$\sigma_{200} = \sqrt{E(L^2) - E(L)^2} = 53{,}619$

400K Limit
$E[L] = (.80)(0) + .15(100{,}000) + .05(400{,}000)$
$= 35{,}000$
$E[L^2] = (.80)(0) + .15(100{,}000^2) + .05(400{,}000^2)$
$= 95\ x\ 10^8$
$\sigma_{400} = \sqrt{E(L^2) - E(L)^2} = 90{,}967$
$ILF = \frac{35{,}000 + (.2)(90{,}967)}{25{,}000 + (.2)(53{,}619)} = 1.489$

Examiner's Comments:
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For full credit, a candidate needed to select the correct limits for evaluation, as well as correctly apply all the formulas, especially recognizing that the Risk Load was 20% of the Standard Deviation for each limit. Common mistakes that resulted in minimal credit included using the Variance or Second Moment for calculating the risk load at each limit. Given the magnitude of the Variance and Second Moment, the use of these produce unrealistic risk adjusted premiums at each limit. Another

common mistake resulting in minimal credit was using the Standard Distribution from the total distribution. Risk loads should vary by limit to appropriately reflect the difference in risk.
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