King Saud University

Name: **ID:**

✗ For a fully continuous whole life insurance of 1 on (x):

(i) π is the benefit premium.

(ii) L is the loss-at-issue random variable with the premium equal to π.

(iii) L* is the loss-at-issue random variable with the premium equal to 1.25π.

(iv) $\bar{a}_x = 5.0$.

(v) $\delta = 0.08$

(vi) Var(L) = 0.5625

Calculate the sum of the expected value and the standard deviation of L*.

(A) 0.59 (B) 0.71 (C) 0.86 (D) 0.89 (E) 1.01

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(B) We have that

$$\pi = \frac{\overline{A}_x}{\overline{a}_x} = \frac{1 - \overline{a}_x\delta}{\overline{a}_x} = \frac{1-(5)(0.08)}{5} = 0.12, \;\; \pi^* = (1.25)\pi = 0.15,$$

$$E[L^*] = \overline{A}_x - (1.25)\pi\overline{a}_x = -(0.25)\pi\overline{a}_x = -(0.25)(0.12)(5) = -0.15,$$

$$\mathrm{Var}(L^*) = \mathrm{Var}(\overline{Z}_x)\left(1+\frac{\pi^*}{\delta}\right)^2 = \mathrm{Var}(L)\frac{\left(1+\frac{\pi^*}{\delta}\right)^2}{\left(1+\frac{\pi}{\delta}\right)^2} = 0.5625\frac{\left(1+\frac{0.15}{0.08}\right)^2}{\left(1+\frac{0.12}{0.08}\right)^2}$$

$$\sqrt{\mathrm{Var}(L^*)} = \sqrt{0.5625}\frac{1+\frac{0.15}{0.08}}{1+\frac{0.12}{0.08}} = 0.8625,$$

$$E[L^*] + \sqrt{\mathrm{Var}(L^*)} = -0.15 + 0.7744565217 = 0.7125.$$