EXAM M QUESTIONS OF THE WEEK

Question 8 - Week of September 12

An n year fully discrete endowment insurance for $100,000 issued to (x) has a benefit premium of $2061. Expenses on the policy per year are $25 plus 20% of the expense-loaded premium G, along with a settlement expense of $A. Given that $\sigma(_0L_e)\big/\sigma(_0L) = 1.0005$, what is G ?

The solution can be found below.

Question 8 Solution

$G \cdot \ddot{a}_{x:\overline{n}|} = (100{,}000 + A) \cdot A_{x:\overline{n}|} + (.2 \cdot G + 25) \cdot \ddot{a}_{x:\overline{n}|} \rightarrow G = (100{,}000 + A) \cdot P + .2 \cdot G + 25$

$\rightarrow .8 \cdot G - 25 = (100{,}000 + A) \cdot P$ (where P is the net annual premium) .

$_0 L_e = (100{,}000 + A) \cdot Z + (.2 \cdot G + 25 - G) \cdot \frac{1 - Z}{d}$ (where Z is the present value random variable

for an n year endowment insurance) $= (100{,}000 + A) \cdot Z - P \cdot (100{,}000 + A) \cdot \left(\frac{1 - Z}{d} \right)$

$= (100{,}000 + A) \cdot \left(1 + \frac{P}{d} \right) \cdot Z - (100{,}00 + A) \cdot \frac{P}{d}$.

$_0 L = 100{,}000 \cdot Z - 100{,}000 \cdot P \cdot \left(\frac{1 - Z}{d} \right) = 100{,}000 \cdot \left(1 + \frac{P}{d} \right) \cdot Z - 100{,}000 \cdot \frac{P}{d}$

$\frac{\sigma(_0 L_e)}{\sigma(_0 L)} = \frac{(100{,}000 + A) \cdot \left(1 + \frac{P}{d} \right)}{100{,}000 \cdot \left(1 + \frac{P}{d} \right)} = 1 + \frac{A}{100{,}000} = 1.0005 \rightarrow A = 50$

$\rightarrow G = \frac{(100{,}050) \cdot P_{x:\overline{n}|}}{.8} + 31.25 = \frac{(1.0005) \cdot (2061)}{.8} + 31.25 = 2609$.