

Question #170

Answer: E

Let G be the gross premium.

Expected present value (EPV) of benefits = $1000A_{50}$.

EPV of expenses, except claim expense = $15 + 1 \times \ddot{a}_{50}$

EPV of claim expense = $50A_{50}$ (50 is paid when the claim is paid)

EPV of premiums = $G\ddot{a}_{50}$

Equivalence principle: $G\ddot{a}_{50} = 1000A_{50} + 15 + 1 \times \ddot{a}_{50} + 50A_{50}$

$$G = \frac{1050A_{50} + 15 + \ddot{a}_{50}}{\ddot{a}_{50}}$$

For the given survival function,

$$A_{50} = \frac{1}{l_{50}} \sum_{k=1}^{50} v^k (l_{50+k-1} - l_{50+k}) = \frac{1}{100} \sum_{k=1}^{50} v^k (2) = \frac{a_{\overline{50}|}}{50} = \frac{1 - 1.05^{-50}}{0.05(50)} = 0.36512$$

$$\ddot{a}_{50} = \frac{1 - A_{50}}{d} = 13.33248$$

Solving for G , $G = 30.88$