

Name: KEY Quiz Score: /20

Quiz 2: Thursday, January 29, 2015

1. An insurer issues a 30-year annual premium endowment insurance policy with sum insured \$100,000 to a select life aged 51. The insurer incurs initial expenses of \$500 and renewal expenses of 2% of each premium, including the first. The death benefit is payable immediately upon death.

(a) Write down a formula for L_0^g , the gross future loss random variable. (Simplify if possible.)

$$\begin{aligned} L_0^g &= 100,000 v^{\min\{T_{[51]}, 30\}} + 500 + 0.02 P \ddot{a}_{\min\{K_{[51]}+1, 30\}} - P \ddot{a}_{\min\{K_{[51]}+1, 30\}} \\ &= 100,000 v^{\min\{T_{[51]}, 30\}} + 500 - 0.98 P \ddot{a}_{\min\{K_{[51]}+1, 30\}} \end{aligned}$$

(b) Find an expression for the annual premium, P , using the equivalence premium principle. (Write it in terms of actuarial symbols; you don't have enough information to find a numerical answer.)

e.p.p: $E[L_0^g] = 0$. By linearity, we get

$$100,000 \bar{A}_{[51]:\overline{30}|} + 500 - 0.98 P \ddot{a}_{[51]:\overline{30}|} = 0$$

$$0.98 P \ddot{a}_{[51]:\overline{30}|} = 100,000 \bar{A}_{[51]:\overline{30}|} + 500$$

$$P = \frac{100,000 \bar{A}_{[51]:\overline{30}|} + 500}{0.98 \ddot{a}_{[51]:\overline{30}|}}$$