

MATH 3630 - Actuarial Mathematics I

Fall 2017 - Valdez

Quiz No. 6

Wednesday, 8 November 2017

Name: EMIL

Student ID: Suggested Solution

For a whole life annuity-immediate issued to (50), you are given:

- For age before 65, mortality pattern follows the constant force with $\mu = 0.01$.

- $\delta = 0.05$

- $A_{65} = 0.45$

Calculate a_{50} .

$$A_{50} = A'_{50:\overline{15}|} + {}_{15}E_{50} A_{65}$$

$$A'_{50:\overline{15}|} = \sum_{k=0}^{14} v^{k+1} {}_kP_{50} q_{50+k}$$

$v^{k+1} = e^{-0.05(k+1)}$ ${}_kP_{50} = e^{-0.01k}$ $q_{50+k} = e^{-0.01k}$

$$= (1 - e^{-0.01}) e^{-0.05} \sum_{k=0}^{14} e^{-0.06k}$$

$$= (1 - e^{-0.01}) e^{-0.05} \frac{1 - e^{-0.90}}{1 - e^{-0.06}}$$

$$= 0.09644902$$

$${}_{15}E_{50} = v^{15} {}_{15}P_{50} = e^{-0.05(15)} e^{-0.01(15)} = e^{-0.90} = 0.4065697$$

$$A_{50} = 0.0964492 + 0.4065697(0.45) = 0.2794054$$

$$\ddot{a}_{50} = \frac{1 - A_{50}}{d} = \frac{1 - 0.2794054}{1 - e^{-0.05}} = 14.77519$$

$$a_{50} = \ddot{a}_{50} - 1 = \underline{\underline{13.77519}}$$