

Solution # 68

No benefit 1st year, 5000 thereafter
Premiums payable for life

$$q_x = .05 \quad v = .9 \Rightarrow d = .1 \quad \ddot{a}_x = 5 \quad {}_{10}V_x = .2$$

Calculate ${}_{10}V$ for this special ins.

$${}_{10}V = 5,000 A_{x+10} - \pi \ddot{a}_{x+10} \quad \pi \neq P_x \text{ because no benefit in 1st year}$$

$$\pi = \frac{5000(A_x - vq_x)}{\ddot{a}_x}$$

$$A_x = vq_x + v^2 p_x q_{x+1} + \dots$$

$$A_x - vq_x = v^2 p_x q_{x+1} + \dots$$

$$\ddot{a}_x = 5 = \frac{1 - A_x}{d} \quad 5 = \frac{1 - A_x}{.1} \Rightarrow A_x = .5$$

$$\pi = \frac{5000(.5 - (.9)(.05))}{5} = 455$$

$$.2 = {}_{10}V_x = 1 - \frac{\ddot{a}_{x+10}}{\ddot{a}_x} \quad .2 = 1 - \frac{\ddot{a}_{x+10}}{5} \Rightarrow \ddot{a}_{x+10} = 4$$

$$\ddot{a}_{x+10} = \frac{1 - A_{x+10}}{d} \quad 4 = \frac{1 - A_{x+10}}{.1} \Rightarrow A_{x+10} = .6$$

$${}_{10}V = 5000(.6) - 455(4)$$

$$= 1180 \quad \boxed{D}$$