Solution #10

Fully Discrete WL 1000 on (40)

Premium determined at issue

Mortality assumptions change at $t=10$

at issue: $_{k|}q_{40} = .02 \quad k=(0,49)$ $\qquad d=.05$

$\to v=.95$

Revised: $_{k|}q_{50} = .04 \quad k=(0,24)$

Calculate $E[{}_{10}L \mid K_{40} \geq 10]$

$= {}_{10}V = PVFB - PVFP$

Calculate the premium $P_{40} = \dfrac{A_{40}}{\ddot{a}_{40}}$

$$A_{40} = \sum_{0}^{49} v^{k+1} \, {}_{k|}q_{40}$$

$$= .02(v + v^2 + \ldots + v^{50}) = .02v\left(\frac{1-v^{50}}{1-v}\right) = .35706$$

$$\ddot{a}_{40} = \frac{1-A_{40}}{d} = \frac{1-.35706}{.05} = 12.985$$

$$P_{40} = \frac{.35706}{12.985} = .027013$$

$$E[{}_{10}L \mid K_{40} \geq 10] = A_{50}^{(R)} - P_{40}\,\ddot{a}_{50}^{(R)}$$

$$A_{50} = \sum_{0}^{24} v^{k+1}\ {}_{k|}q_{50}$$

$$= .04(v + v^2 + \cdots + v^{25}) = .04v\left(\frac{1 - v^{25}}{1 - v}\right) = .54918$$

$$\ddot{a}'_{50} = \frac{1 - A_{50}}{d} = 9.01632$$

$$A_{50}^{(R)} - P_{40}\,\ddot{a}_{50}^{(R)}$$

$$\cancel{E\ .54918} = .54918 - (.27013)(9.01632) = .305622$$

$$x(1000) = 305.622 \quad \boxed{E}$$