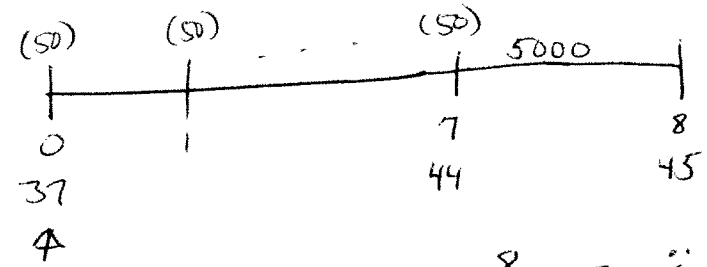
MLCM353

1) (a)

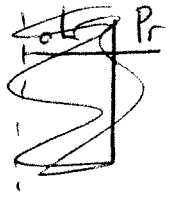



$$(_0L \mid T=7.1) = 5000 v^8_{.06} - 50\ddot{a}_{8|.06} = 2807.94$$

(b) $$_0L = 5000 v^{K+1} - 50\ddot{a}_{\overline{K+1}|} = \left(5000 + \frac{50}{d}\right) v^{K+1} - \frac{50}{d}$$

$$d = \frac{.06}{1.06}$$

$$_0L = 0 \Longrightarrow K = 31+$$




| $_0L$ | Pr |
|---|---|
| $28.33 = 5000v^{32} - 50\ddot{a}_{\overline{32}\|}$ | $Pr(K=31)$ ↑ $_0L>0$ |
| $-23.27 = 5000v^{33} - 50\ddot{a}_{\overline{33}\|}$ | $Pr(K=32)$ ↓ $_0L<0$ |

$$Pr(loss) = Pr(_0L > 0) = {}_{32}q_{37} = Pr(K < 32)$$

$$\therefore Pr(loss) = 1 - \frac{l_{69}}{l_{37}} \overset{ILT}{=} .27268$$

(c) $$E[_0L] = 5000A_{37} - 50\ddot{a}_{37} \overset{ILT}{=} -54.135$$

(d) $$Var(_0L) = \left(5000 + \frac{50}{d}\right)^2 \left[{}^2A_{37} - (A_{37})^2\right]$$

$$\overset{ILT}{=} 690400.19$$

2) (a) $\left({}_0L \mid T=8.7\right) = 1000v^{8.7} - 35\bar{a}_{\overline{8.7}|}$

$= 1000e^{-.07(8.7)} - 35\,\frac{1-e^{-.07(8.7)}}{.07} = 315.84$

(b) ${}_0L = 1000v^T - 35\bar{a}_{\overline{T}|} = \left(1000 + \frac{35}{\delta}\right)v^T - \frac{35}{\delta}$

$\delta = .07 \Rightarrow {}_0L = 1500v^T - 500 = 1500e^{-.07T} - 500$

${}_0L > 0 \Rightarrow e^{-.07T} > \frac{500}{1500} \Rightarrow T < \frac{\ln(1/3)}{-.07} = t$

$\therefore \Pr(\text{loss}) = {}_tq_x = 1 - {}_tp_x = 1 - e^{-\mu \cdot t} \overset{\mu=.03}{=\!=} .37552$

(c) $E[{}_0L] = 1000\bar{A}_x - 35\bar{a}_x$

$\overset{CF}{=\!=} 1000 \cdot \frac{\mu}{\mu+\delta} - 35 \cdot \frac{1}{\mu+\delta} \overset{\substack{\mu=.03 \\ \delta=.07}}{=\!=} -50$

(d) $Var({}_0L) = \left(1000 + \frac{35}{\delta}\right)^2 \left[{}^2\bar{A}_x - (\bar{A}_x)^2\right]$

$= (1500)^2 \left[\frac{\mu}{\mu+2\delta} - \left(\frac{\mu}{\mu+\delta}\right)^2\right] = 194558.82$

3) (See Video Solution)

$p \doteq .1292$

4) $_0L = 8000\, Z_{35:\overline{17}|} - 300\, \ddot{Y}_{35:\overline{17}|}$

$= \left(8000 + \frac{300}{d}\right) Z_{35:\overline{17}|} - \frac{300}{d}$

$Var(_0L) = \left(8000 + \frac{300}{d}\right)^2 \left[{}^2A_{35:\overline{17}|} - \left(A_{35:\overline{17}|}\right)^2\right]$

$d = \frac{.06}{1.06}$

$A_{35:\overline{17}|} = A_{35} - {}_{17}E_{35} \cdot A_{52} + {}_{17}E_{35}$

${}^2A_{35:\overline{17}|} = {}^2A_{35} - {}^2_{17}E_{35} \cdot {}^2A_{52} + {}^2_{17}E_{35}$

} See #8 from MLCM252 Exercises

$\therefore \sqrt{Var(_0L)} = 806.93$

5) $${}_0L = \left(1 + \frac{.025}{\delta}\right) \overline{Z}_{40} - \frac{.025}{\delta}$$

$$Var({}_0L) = \left(1 + \frac{.025}{\delta}\right)^2 \left[{}^2\bar{A}_{40} - (\bar{A}_{40})^2\right]$$

$$\delta = \ln(1.05)$$

$$\bar{A}_{40} = \frac{1}{60}\,\bar{a}_{\overline{60}|} = \frac{1}{60} \cdot \frac{1 - v_{.05}^{60}}{\delta} = \boxed{1}$$

$${}^2\bar{A}_{40} = \frac{1}{60} \cdot \frac{1 - v_{.05}^{120}}{2\delta} = \boxed{2}$$

$$\therefore Var({}_0L) = \left(1 + \frac{.025}{\ln(1.05)}\right)^2 \left[\boxed{2} - (\boxed{1})^2\right] \doteq .15046$$