

# Solutions to MLCM4S3 Exercises

$$1) \quad {}_{20}L = 10000 Z_{50} - 70 \ddot{Y}_{50} \quad \ddot{Y}_{50} = \frac{1 - Z_{50}}{d}$$

$$\therefore {}_{20}L = \left(10000 + \frac{70}{d}\right) Z_{50} - \frac{70}{d}$$

$$\Rightarrow \text{Var}({}_{20}L) = \left(10000 + \frac{70}{d}\right)^2 \left[ {}^2A_{50} - (A_{50})^2 \right]$$

$$d = \frac{i}{1+i} = \frac{.06}{1.06}$$

$$\Rightarrow \text{Var}({}_{20}L) \stackrel{\text{FLT}}{=} \left(10000 + \frac{70}{.06(1.06)}\right)^2 \left[ .09476 - (.24905)^2 \right]$$

$$= 4,133,095$$

2) (See Video Solution)

$$20V = 1628.60$$

$$3) \quad {}_{10}L = 5000 \bar{Z}_{x+10} \quad (\text{no more premiums after age } x+10)$$

$$\Rightarrow \text{Var}({}_{10}L) = 5000^2 \left[ {}^2\bar{A}_{x+10} - (\bar{A}_{x+10})^2 \right]$$

$$\bar{A}_{x+10} \stackrel{\text{CF}}{=} \frac{\mu}{\mu + \delta} = \frac{2}{6} = \frac{1}{3}$$

$${}^2\bar{A}_{x+10} \stackrel{\text{CF}}{=} \frac{\mu}{\mu + 2\delta} = \frac{2}{10} = \frac{1}{5}$$

$$\therefore \text{Var}({}_{10}L) = 2,222,222$$

4) (See Video Solution)

$$\sqrt{\text{Var}(10L)} = 1499.26$$