

Each problem is worth 10 points. Show all work for full credit, and use correct notation. Simplify answers completely. See other side for additional problems.

1. Using ILT mortality, determine each of the following:

(a) ${}_{0.5}q_{70}$ using the CF assumption ${}_{.5}q_{70} = 1 - \frac{l_{70.5}}{l_{70}}$

$$l_{70} = 6616155$$

$$l_{71} = 6396609$$

$$l_{70.5} = (l_{70})^{.5} (l_{71})^{.5} = \sqrt{l_{70} \cdot l_{71}}$$

$$\Rightarrow {}_{.5}q_{70} = .01673 \dots$$

- (b) ${}_{1.8}p_{72.2}$ using the UDD assumption

$${}_{1.8}P_{72.2} = \frac{l_{74}}{l_{72.2}}$$

$$l_{72} = 6164663$$

$$l_{73} = 5920394$$

$$l_{74} = 5664051$$

$$l_{72.2} = l_{72}(.8) + l_{73}(.2)$$

$$\Rightarrow {}_{1.8}P_{72.2} = .92613 \dots$$

2. Given $l_{90} = 1000$, and $p_{90} = .8$, and ${}_2p_{90} = .45$ determine each of the following:

$$l_{91} = 800 \quad l_{92} = 450$$

- (a) $l_{90.45}$ using the CF assumption

$$l_{90.45} = (l_{90})^{.55} \cdot (l_{91})^{.45} = 904.462 \dots$$

- (b) $l_{91.5}$ using the UDD assumption

$$l_{91.5} = l_{91}(.5) + l_{92}(.5) = \frac{l_{91} + l_{92}}{2} = 625$$

3. Given $q_{70} = 0.0104$ and $q_{71} = 0.0117$ determine ${}_{0.7}q_{70.6}$ using the UDD assumption.

Let $l_{70} = 1000$

$$l_{71} = 989.6$$

$$l_{72} = 978.02168$$

$$l_{70.6} = l_{70}(.4) + l_{71}(.6)$$

$$l_{71.3} = l_{71}(.7) + l_{72}(.3)$$

$${}_{.7}q_{70.6} = 1 - \frac{l_{71.3}}{l_{70.6}}$$

$$= .00768 \dots$$

4. Given $q_{80+k} = .1 + .05k$, for $k = 0$ and 1 , determine ${}_{1.3|0.7}q_{80}$ using the UDD assumption.

Let $l_{80} = 1000$

$$l_{81} = 900$$

$$l_{82} = 765$$

$$l_{81.3} = l_{81}(.7) + l_{82}(.3)$$

$${}_{1.3|0.7}q_{80} = \frac{l_{81.3} - l_{82}}{l_{80}}$$

$$= .0945$$

5. Given ${}_kq_{90} = .1(k+1)$, for $k = 0$ and 1 , determine ${}_{0.2|0.5}q_{90.8}$ using the CF assumption

Let $l_{90} = 1000$

$$l_{91} = 900$$

$$l_{92} = 700$$

$$l_{90.8} = (l_{90})^{.2} \cdot (l_{91})^{.8}$$

$$l_{91.5} = \sqrt{l_{91} \cdot l_{92}}$$

$${}_{0.2|0.5}q_{90.8} = \frac{l_{91} - l_{91.5}}{l_{90.8}}$$

$$= .11562 \dots$$