MAP 4175 / 5177 Name: KEY

Quiz 1 Date: September 6, 2018

Show all work for full credit, and use correct notation.

1. Given $q_{80+k} = 0.1(k+1)$ for $k = 0$ and 1, determine ${}_2p_{80}$

$q_{80} = 0.1$

$q_{81} = 0.2$

${}_2P_{80} = P_{80} \cdot P_{81}$

$\therefore \; {}_2P_{80} = (.9)\cdot(.8) = 0.72$

2. Given $T_{40} = 39.35$, determine the values of K_{40}, $K_{40}^{(2)}$, $K_{40}^{(4)}$, and $K_{40}^{(12)}$

$K_{40} = 39$

$K_{40}^{(2)} = 39.0$

$K_{40}^{(4)} = 39.25$

$K_{40}^{(12)} = 39.\overline{33}$

3. Given $K_{80}^{(4)} = 10.50$, determine the range of possible values of T_{80}

$10.50 \leq T_{80} < 10.75$

4. Given

x	q_x
90	0.3
91	0.4
92	0.5
93	0.6

determine the value of the deferred mortality probability ${}_{2|2}q_{90}$

$${}_{2|2}q_{90} = {}_2p_{90} - {}_4p_{90}$$

$$= p_{90} \cdot p_{91} - p_{90} \cdot p_{91} \cdot p_{92} \cdot p_{93}$$

$$= (0.7)(0.6) - (0.7)(0.6)(0.5)(0.4) = 0.336$$

There are several other correct ways to do this problem.

5. Given ${}_{k|}q_{96} = 0.1(k+1)$ for $k = 0,1,2,$ and 3, determine $Var[Min(K_{96}, 2)]$

K_{96}	Pr
0	$q_{96} = 0.1$
1	${}_{1\|}q_{96} = 0.2$
2	${}_{2\|}q_{96} = 0.3$
3	${}_{3\|}q_{96} = 0.4$

$\Longrightarrow$

$Min(K_{96}, 2)$	Pr
0	0.1
1	0.2
2	0.3+0.4 = 0.7

∴ The question is to find $Var(X)$, given

X	Pr
0	0.1
1	0.2
2	0.7

$$Var(X) = E[X^2] - (E[X])^2$$

$$E[X^2] = 0^2(0.1) + 1^2(0.2) + 2^2(0.7) = 3$$

$$E[X] = 0(0.1) + 1(0.2) + 2(0.7) = 1.6$$

$$\therefore Var(X) = 3 - (1.6)^2 = 0.44$$