STAT 472
Spring 2021
Quiz 3

February 16, 2021

1. You are given:

   a. $q_{85} = 0.2$

   b. $q_{86} = 0.4$

   c. Deaths are uniformly distributed between age 85 and 86.

   d. There is a constant force of mortality between age 86 and 87.

   Calculate ${}_{0.4|0.7}q_{85.6}$.

   Solution:

$${}_{0.4|0.7}q_{85.6} = \frac{l_{86} - l_{86.7}}{l_{85.6}} = \frac{800 - 559.49455}{880} = 0.27330$$

$$l_{85} = 1000$$

$$l_{86} = (1000)(1-0.2) = 800$$

$$l_{87} = 800(1-0.4) = 480$$

$$l_{85.6} = (1000)(1-0.6) + 800(0.6) = 880 \quad \text{since it is UDD}$$

$$l_{86.7} = (800)^{(1-0.7)} \cdot (480)^{0.3} = 559.49445$$

2. You are given the following one year select and ultimate mortality table:

$[x]$	$q_{[x]}$	q_{x+1}	$x+1$
80	0.05	0.10	81
81	0.07	0.12	82
82	0.10	0.15	83
83	0.13	0.19	84

If $l_{[81]} = 100,000$, calculate $l_{[80]}$.

Solution:

$$l_{[82]} = l_{[80]} \cdot p_{[80]} \cdot p_{81}$$

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$$==> l_{[80]} \cdot p_{[80]} \cdot p_{81} = l_{[81]} \cdot p_{[81]}$$

$$==> l_{[80]} = \frac{l_{[81]} \cdot p_{[81]}}{p_{[80]} \cdot p_{81}} = \frac{(100,000)(1-0.07)}{(1-0.05)(1-0.10)} = 108,771.93$$