

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

1. (15 points) For a 2-year select period, you are given:

$$q_{40} = q_{41} = q_{42} = 0.2$$

$$d_{[x]} = \frac{1}{2}d_x \text{ for all } x$$

$$d_{[x]+1} = \frac{3}{4}d_{x+1} \text{ for all } x$$

2. (20 points) For a mortality table with a select period of two years, you are given:

x	$q_{[x]}$	$q_{[x]+1}$	q_{x+2}	$x + 2$
50	0.050	0.065	0.080	52
51	0.055	0.070	0.085	53
52	0.060	0.075	0.090	54
53	0.065	0.080	0.095	55

There is a uniform distribution of deaths between integral ages.

Calculate $1000 {}_{1.5|}q_{[51]+0.5}$

3. (15 points) An ultimate mortality table follows $DML(\omega = 40)$. Find the probability that a person, insured two years ago at age 32, will die between ages 35 and 36, given

$$q_{[x]+t} = \frac{t+1}{t+2} q_{x+t}, \quad t = 0, 1, 2$$

$$q_{[x]+t} = q_{x+t}, \quad t = 3, 4, 5, \dots$$