

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:

$$q_{[20]} = 0.1$$

$$q_{[20]+1} = 0.2$$

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

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

Determine  ${}_1|q_{20}$

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	0.0050	0.0063	0.0080	52
51	0.0060	0.0073	0.0090	53
52	0.0070	0.0083	0.0100	54
53	0.0080	0.0093	0.0110	55

The force of mortality is constant between integral ages. Calculate  $1000_{2.5}q_{[50]+0.4}$

3. (15 points) An ultimate mortality table follows  $DML(\omega = 31)$ . Find the probability that a person, insured one year ago at age 20, will die between ages 23 and 24, given

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

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