

Exercise 3.3

- (a) The probability that a life currently aged 75 who has just been selected will survive to reach age 85 is

$${}_{10}p_{[75]} = \frac{\ell_{[75]+10}}{\ell_{[75]}} = \frac{\ell_{85}}{\ell_{[75]}} = \frac{10542}{15930} = 0.6617702.$$

- (b) The probability that a life currently aged 76 who as selected one year ago will die between ages 85 and 87 is given by

$${}_{9|2}q_{[75]+1} = {}_9p_{[75]+1} - {}_{11}p_{[75]+1} = \frac{\ell_{85} - \ell_{87}}{\ell_{[75]+1}} = \frac{10542 - 9064}{15668} = 0.0943324.$$

- (c) ${}_{4|2}q_{[77]+1} = {}_4p_{[77]+1} - {}_6p_{[77]+1} = \frac{\ell_{82}}{\ell_{84}} \ell_{[77]+1} = \frac{12756 - 11250}{14744} = 0.08993489$