

Question #31**Answer: B**

The survival function is $S_0(t) = \left(1 - \frac{t}{\omega}\right)$:

Then,

$$e_x^\circ = \frac{\omega - x}{2} \text{ and } {}_tP_x = \left(1 - \frac{t}{\omega - x}\right)$$

$$e_{45}^\circ = \frac{105 - 45}{2} = 30$$

$$e_{65}^\circ = \frac{105 - 65}{2} = 20$$

$$\begin{aligned} e_{45:65}^\circ &= \int_0^{40} {}_tP_{45:65} dt = \int_0^{40} \frac{60-t}{60} \times \frac{40-t}{40} dt \\ &= \frac{1}{60 \times 40} \left(60 \times 40 \times t - \frac{60+40}{2} t^2 + \frac{1}{3} t^3 \right) \Big|_0^{40} \\ &= 15.56 \end{aligned}$$

$$\begin{aligned} \overline{e_{45:65}^\circ} &= e_{45}^\circ + e_{65}^\circ - e_{45:65}^\circ \\ &= 30 + 20 - 15.56 = 34 \end{aligned}$$

In the integral for $e_{45:65}^\circ$, the upper limit is 40 since 65 (and thus the joint status also) can survive a maximum of 40 years.

Question #32**Answer: E**

$$\begin{aligned} \mu_4 &= -S_0'(4) / S_0(4) \\ &= \frac{-(-e^4 / 100)}{1 - e^4 / 100} \\ &= \frac{e^4 / 100}{1 - e^4 / 100} \\ &= \frac{e^4}{100 - e^4} = 1.202553 \end{aligned}$$