Solution # 31

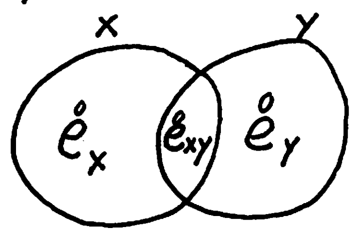
Given:

$l_x = 10(105 - x) \quad 0 \le x \le 105$

(45) and (65) have independent future lifetime

Calculate $\mathring{e}_{\overline{45:65}}$

Expected last-Survivor Time:



$$\mathring{e}_{\overline{xy}} = \mathring{e}_x + \mathring{e}_y - \mathring{e}_{xy}$$

$${}_tP_x = \frac{l_{x+t}}{l_x} = \frac{10(105-(x+t))}{10(105-x)} = \frac{105-x-t}{105-x} \quad \text{(DeMoivre)} \quad \mathring{e}_x = \frac{w-x}{2}$$

$$\mathring{e}_{45} = \int_0^{60} {}_tP_{45}\,dt = \int_0^{60} \frac{60-t}{60}\,dt = 30$$

$$\mathring{e}_{45} = \frac{105-45}{2} = 30$$

$$\mathring{e}_{65} = \int_0^{40} {}_tP_{65}\,dt = \int_0^{40} \frac{40-t}{40}\,dt = 20$$

$$\mathring{e}_{65} = \frac{105-65}{2} = 20$$

$$\mathring{e}_{45:65} = \int_0^{40} {}_tP_{45:65}\,dt = \int_0^{40} \left(\frac{60-t}{60}\right)\left(\frac{40-t}{40}\right)dt$$

$$= 15.5556$$

$$\mathring{e}_{\overline{xy}} = \mathring{e}_x + \mathring{e}_y - \mathring{e}_{xy}$$

$$= 30 + 20 - 15.5556$$

$$= 34.44 \approx 34$$

$\boxed{B}$