

90. Solution: C

Let  $T_1$  be the time until the next Basic Policy claim, and let  $T_2$  be the time until the next Deluxe policy claim. Then the joint pdf of  $T_1$  and  $T_2$  is

$$f(t_1, t_2) = \left( \frac{1}{2} e^{-t_1/2} \right) \left( \frac{1}{3} e^{-t_2/3} \right) = \frac{1}{6} e^{-t_1/2} e^{-t_2/3}, \quad 0 < t_1 < \infty, \quad 0 < t_2 < \infty \text{ and we need to find}$$

$$\begin{aligned} P[T_2 < T_1] &= \int_0^{\infty} \int_0^{t_1} \frac{1}{6} e^{-t_1/2} e^{-t_2/3} dt_2 dt_1 = \int_0^{\infty} \left[ -\frac{1}{2} e^{-t_1/2} e^{-t_2/3} \right]_0^{t_1} dt_1 \\ &= \int_0^{\infty} \left[ \frac{1}{2} e^{-t_1/2} - \frac{1}{2} e^{-t_1/2} e^{-t_1/3} \right] dt_1 = \int_0^{\infty} \left[ \frac{1}{2} e^{-t_1/2} - \frac{1}{2} e^{-5t_1/6} \right] dt_1 = \left[ -e^{-t_1/2} + \frac{3}{5} e^{-5t_1/6} \right]_0^{\infty} = 1 - \frac{3}{5} = \frac{2}{5} \\ &= 0.4 . \end{aligned}$$