

Question #191

Answer: D

For the density where $T_x \neq T_y$,

$$\begin{aligned}\Pr(T_x < T_y) &= \int_{y=0}^{40} \int_{x=0}^y 0.0005 dx dy + \int_{y=40}^{50} \int_{x=0}^{40} 0.0005 dx dy \\ &= \int_{y=0}^{40} 0.0005 x \Big|_0^y dy + \int_{y=40}^{50} 0.0005 x \Big|_0^{40} dy \\ &= \int_0^{40} 0.0005 y dy + \int_{y=40}^{50} 0.02 dy \\ &= \frac{0.0005 y^2}{2} \Big|_0^{40} + 0.02 y \Big|_{40}^{50} \\ &= 0.40 + 0.20 = 0.60\end{aligned}$$

For the overall density,

$$\Pr(T_x < T_y) = 0.4 \times 0 + 0.6 \times 0.6 = 0.36$$

where the first 0.4 is the probability that $T_x = T_y$ and the first 0.6 is the probability that $T_x \neq T_y$.