

110. Let X and Y be continuous random variables with joint density function

$$f(x, y) = \begin{cases} 24xy & \text{for } 0 < x < 1 \text{ and } 0 < y < 1-x \\ 0 & \text{otherwise.} \end{cases}$$

Calculate $P\left[Y < X \mid X = \frac{1}{3}\right]$.

(A) $\frac{1}{27}$

(B) $\frac{2}{27}$

(C) $\frac{1}{4}$

(D) $\frac{1}{3}$

(E) $\frac{4}{9}$