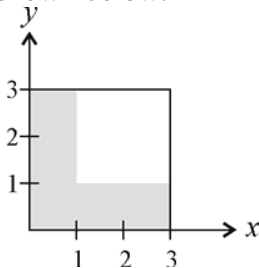


78. Solution: B

That the device fails within the first hour means the joint density function must be integrated over the shaded region shown below.



This evaluation is more easily performed by integrating over the unshaded region and subtracting from 1.

$$\Pr[(X < 1) \cup (Y < 1)]$$

$$= 1 - \int_1^3 \int_1^3 \frac{x+y}{27} dx dy = 1 - \int_1^3 \frac{x^2 + 2xy}{54} \Big|_1^3 dy = 1 - \frac{1}{54} \int_1^3 (9 + 6y - 1 - 2y) dy$$

$$= 1 - \frac{1}{54} \int_1^3 (8 + 4y) dy = 1 - \frac{1}{54} (8y + 2y^2) \Big|_1^3 = 1 - \frac{1}{54} (24 + 18 - 8 - 2) = 1 - \frac{32}{54} = \frac{11}{27} = 0.41$$