

## Question #11

Key: D

$$\Pr(\theta = 1 | X = 5) = \frac{f(5 | \theta = 1) \Pr(\theta = 1)}{f(5 | \theta = 1) \Pr(\theta = 1) + f(5 | \theta = 3) \Pr(\theta = 3)}$$

$$= \frac{(1/36)(1/2)}{(1/36)(1/2) + (3/64)(1/2)} = 16/43$$

$$\begin{aligned} \Pr(X_2 > 8 | X_1 = 5) &= \Pr(X_2 > 8 | \theta = 1) \Pr(\theta = 1 | X_1 = 5) + \Pr(X_2 > 8 | \theta = 3) \Pr(\theta = 3 | X_1 = 5) \\ &= (1/9)(16/43) + (3/11)(27/43) = .2126. \end{aligned}$$

For the last line,  $\Pr(X > 8 | \theta) = \int_8^{\infty} \theta(x + \theta)^{-2} dx = \theta(8 + \theta)^{-1}$  is used.