

Question # 43**Answer: E**

The posterior density, given an observation of 3 is:

$$\begin{aligned}\pi(\theta | 3) &= \frac{f(3 | \theta)\pi(\theta)}{\int_1^{\infty} f(3 | \theta)\pi(\theta)d\theta} = \frac{\frac{2\theta^2}{(3 + \theta)^3} \frac{1}{\theta^2}}{\int_1^{\infty} 2(3 + \theta)^{-3} d\theta} \\ &= \frac{2(3 + \theta)^{-3}}{-(3 + \theta)^{-2} \Big|_1^{\infty}} = 32(3 + \theta)^{-3}, \quad \theta > 1.\end{aligned}$$

Then,

$$\Pr(\Theta > 2) = \int_2^{\infty} 32(3 + \theta)^{-3} d\theta = -16(3 + \theta)^{-2} \Big|_2^{\infty} = \frac{16}{25} = .64.$$