52. From Sample Problem 40-8, we know that the probability of finding the electron in the ground state of the hydrogen atom inside a sphere of radius r is given by

$$p(r) = 1 - e^{-2x}\,(1 + 2x + 2x^2)$$

where $x = r/a$. Thus the probability of finding the electron between the two shells indicated in this problem is given by

$$\begin{aligned} p(a < r < 2a) &= p(2a) - p(a) \\ &= \left[1 - e^{-2x}\,(1 + 2x + 2x^2)\right]_{x=2} - \left[1 - e^{-2x}\,(1 + 2x + 2x^2)\right]_{x=1} \\ &= 0.44\ . \end{aligned}$$