

35. Solution: C

Let the random variable T be the future lifetime of a 30-year-old. We know that the density of T has the form $f(x) = C(10 + x)^{-2}$ for $0 < x < 40$ (and it is equal to zero otherwise). First, determine the proportionality constant C from the condition

$$\int_0^{40} f(x)dx = 1:$$

$$1 = \int_0^{40} f(x)dx = -C(10+x)^{-1} \Big|_0^{40} = \frac{2}{25}C$$

so that $C = \frac{25}{2} = 12.5$. Then, calculate $P(T < 5)$ by integrating $f(x) = 12.5(10 + x)^{-2}$ over the interval (0,5).