33. Solution: B
Note that
\[
Pr[X > x] = \int_x^{20} 0.005(20 - t) dt = 0.005\left[20t - \frac{1}{2} t^2 \right]_x^{20} = 0.005\left(400 - 200 - 20x + \frac{1}{2} x^2 \right) = 0.005\left(200 - 20x + \frac{1}{2} x^2 \right)
\]
where \(0 < x < 20\). Therefore,
\[
Pr[X > 16 | X > 8] = \frac{Pr[X > 16]}{Pr[X > 8]} = \frac{200 - 20(16) + \frac{1}{2}(16)^2}{200 - 20(8) + \frac{1}{2}(8)^2} = \frac{8}{72} = \frac{1}{9}
\]

34. Solution: C
We know the density has the form \(C(10 + x)^{-2}\) for \(0 < x < 40\) (equals zero otherwise).
First, determine the proportionality constant \(C\) from the condition \(\int_0^{40} f(x)dx=1:\n\]
\[
1 = \int_0^{40} C(10 + x)^{-2} dx = -C(10 + x)^{-1}\bigg|_0^{40} = \frac{C}{10} - \frac{C}{50} = \frac{2}{25} C
\]
so \(C = 25/2\), or 12.5 . Then, calculate the probability over the interval (0, 6):
\[
12.5\int_0^{6} (10 + x)^{-2} dx = -(10 + x)^{-1}\bigg|_0^{6} = \left(\frac{1}{10} - \frac{1}{16}\right)(12.5) = 0.47 .
\]

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:\n\]
\[
1 = \int_0^{40} f(x)dx = -C(10 + x)^{-1}\bigg|_0^{40} = \frac{2}{25} C
\]
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).