87. Solution: D

Let X denote the difference between true and reported age. We are given X is uniformly distributed on \((-2.5, 2.5)\). That is, X has pdf \(f(x) = \frac{1}{5}, \quad -2.5 < x < 2.5\). It follows that

\[
\mu_x = E[X] = 0
\]

\[
\sigma_x^2 = \text{Var}[X] = E[X^2] = \int_{-2.5}^{2.5} \frac{x^2}{5} \, dx = \frac{x^3}{15}\bigg|_{-2.5}^{2.5} = \frac{2(2.5)^3}{15} = 2.083
\]

\[\sigma_x = 1.443\]

Now \(\bar{X}_{48}\), the difference between the means of the true and rounded ages, has a distribution that is approximately normal with mean 0 and standard deviation \(\frac{1.443}{\sqrt{48}} = 0.2083\). Therefore,

\[
P\left[\frac{-1}{4} \leq \bar{X}_{48} \leq \frac{1}{4}\right] = P\left[\frac{-0.25}{0.2083} \leq Z \leq \frac{0.25}{0.2083}\right] = P[-1.2 \leq Z \leq 1.2] = P[Z \leq 1.2] - P[Z \leq -1.2] = P[Z \leq 1.2] - 1 + P[Z \leq 1.2] = 2P[Z \leq 1.2] - 1 = 2(0.8849) - 1 = 0.77.
\]

88. Solution: C

Let X denote the waiting time for a first claim from a good driver, and let Y denote the waiting time for a first claim from a bad driver. The problem statement implies that the respective distribution functions for X and Y are

\[
F(x) = 1 - e^{-x/6}, \quad x > 0 \quad \text{and} \quad G(y) = 1 - e^{-y/3}, \quad y > 0
\]

Therefore,

\[
\Pr[(X \leq 3) \cap (Y \leq 2)] = \Pr[X \leq 3] \Pr[Y \leq 2] = F(3)G(2) = (1 - e^{-1/2})(1 - e^{-2/3}) = 1 - e^{-2/3} - e^{-1/2} + e^{-7/6}
\]