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 $f(x) = 1/5$, $-2.5 < x < 2.5$. It follows that

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

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

$$\sigma_x = 1.443$$

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,

$$P\left[-\frac{1}{4} \le \bar{X}_{48} \le \frac{1}{4}\right] = P\left[\frac{-0.25}{0.2083} \le Z \le \frac{0.25}{0.2083}\right] = P[-1.2 \le Z \le 1.2] = P[Z \le 1.2] - P[Z \le -1.2]$$

$$= P[Z \le 1.2] - 1 + P[Z \le 1.2] = 2P[Z \le 1.2] - 1 = 2(0.8849) - 1 = 0.77.$$