(c) What is the probability that the average weight of four randomly selected monkeys is between 12 and 16 pounds?

$$\begin{aligned} P(12 \le \bar{x} \le 16) &= P(\tfrac{12-15}{1.5} \le Z \le \tfrac{16-15}{1.5}) \\ &= P(-2.0 \le Z \le 0.67) \\ &= 0.7486 - 0.0228 \\ &= 0.7258 \end{aligned}$$

(d) How many weights must be averaged in order to obtain a standard deviation of one pound?

$n = (\frac{3}{1})^2 = 9$

Nine weights must be averaged in order to obtain a standard deviation of one pound.

3. Forty percent of Americans have type A blood.

(a) Find the mean and standard deviation of the sampling distribution of the proportion of 500 randomly selected Americans that have type A blood?

$\mu_{\hat{p}} = 0.40$

$\sigma_{\hat{p}} = \sqrt{\frac{0.40(1-0.40)}{500}} \approx 0.0219$

(b) Find the probability that the proportion of 500 randomly selected Americans that have type A blood is greater than 0.45.

$$\begin{aligned} P(\hat{p} > 0.45) &= P(Z > \tfrac{0.45-0.40}{0.0219}) \\ &= P(Z > 2.28) \\ &= 1 - P(Z \le 2.28) \\ &= 1 - 0.9887 \\ &= 0.0113 \end{aligned}$$

(c) Explain why the computations used in (b) are justified.

The computations in (b) are justified because $np = 500(0.40) = 200 \ge 10$, $n(1-p) = 500(1-0.40) = 300 \ge 10$, and the population of Americans is greater than or equal to $500 * 10 = 5000$.

(d) Without making any computations, explain how the standard deviation of the sampling distribution of the proportion of 250 randomly selected Americans that have type A blood would compare to the standard deviation computed in (a).

The standard deviation of the sampling distribution of the proportion of 250 randomly selected Americans that have type A blood would be larger than the standard deviation computed in (a).