8-4 (p.261)
(a)

$$\begin{aligned}
\bar{x} &\pm z_{0.025}\frac{\sigma}{\sqrt{n}} \\
36 &\pm 1.96\frac{12}{\sqrt{50}} \\
(32.67 &, \quad 39.33)
\end{aligned}$$

(b)

$$\begin{aligned}
z_{0.025}\frac{\sigma}{\sqrt{n}} &= 2 \\
1.96\frac{12}{\sqrt{n}} &= 2 \\
\frac{1}{\sqrt{n}} &= \frac{2}{(12)(1.96)} \\
n &= 138.2976
\end{aligned}$$

To be on the safe side, you'd want a sample size of 139, which would make it a little less than ± 2.

(c)

$$\begin{aligned}
z_{0.025}\frac{\sigma}{\sqrt{n}} &= e \\
1.96\frac{\sigma}{\sqrt{n}} &= e \\
\frac{1}{\sqrt{n}} &= \frac{e}{1.96\sigma} \\
n &= (1.96\frac{\sigma}{e})^2
\end{aligned}$$

(d)

$$\begin{aligned}
n &= (1.96\frac{12}{1})^2 \\
&= [(1.96)(12)]^2 \\
&= 553.1904
\end{aligned}$$

To be on the safe side, you'd want a sample size of 554, which would make it a little less than ± 1.

(e) To achieve 16 times the accuracy, you need a sample that is $16^2 = 256$ times larger.

8-6 (p. 264)

(a)

$$\begin{aligned}
\bar{x} &\pm t_{0.025}^{n-1}\frac{s}{\sqrt{n}} \\
148000 &\pm 2.06\frac{62000}{\sqrt{25}} \\
(122456 &, \quad 173544)
\end{aligned}$$

(b) It is possible that someone paid \$206,000 for a house in this suburb, since the confidence interval is for the average price. If the standard deviation for the distribution of home prices is around \$62,000, then there's quite a bit of variation to be expected.

8-7 (p. 264)
(a)

$$\bar{x} = 99.8$$

$$s \approx 54.65$$

$$\begin{aligned}
99.8 &\pm 2.78\frac{54.65}{\sqrt{5}} \\
(31.86 &, \quad 167.74)
\end{aligned}$$

(b)

$$\bar{x} = 50(99.8) = 4990$$

$$s \approx 50(54.65) \approx 2732.5$$

$$\begin{aligned}
4990 &\pm 2.78\frac{2732.5}{\sqrt{5}} \\
(1592.8 &, \quad 8387.2)
\end{aligned}$$

(c) Yes, the confidence interval does bracket the true area of 3620 thousand square miles.

8-8 (p. 264)
(a)

$$\bar{x} = 44.2$$

$$s \approx 35.65$$

$$\begin{aligned}
44.2 &\pm 2.78\frac{35.65}{\sqrt{5}} \\
(-0.12 &, \quad 88.5)
\end{aligned}$$

(b)

$$\bar{x} = 2210$$

$$s \approx 1782.3$$

$$\begin{array}{ccc} 2210 & \pm & 2.78\dfrac{1782.3}{\sqrt{5}} \\ (-5.9 & , & 4425.9) \end{array}$$

(c) Yes, the confidence interval does bracket the true area of 3620 square thousand miles.

(d) Some of them might be wrong. Let's suppose that we have the sample: 11, 41, 77, 24, 8 (a combination of the previous two samples). Then, we have the following:

$$\bar{x} = 32.2(50) = 1610$$

$$s \approx 1411.3$$

$$\begin{array}{ccc} 1610 & \pm & 2.78\dfrac{1411.3}{\sqrt{5}} \\ (-144.6 & , & 3364.6) \end{array}$$

This confidence interval doesn't bracket the true area of 3620 square thousand miles. So, depending on the sample we draw, we may be right or wrong; that is, the interval may include the true value or may not.