(a)
\[
\bar{x} \pm \frac{z_{0.025}}{\sqrt{n}} \sigma
\]
\[
36 \pm 1.96 \frac{12}{\sqrt{39}}
\]
\[
(32.67, 39.33)
\]

(b)
\[
z_{0.025} \frac{\sigma}{\sqrt{n}} = 2
\]
\[
1.96 \frac{12}{\sqrt{n}} = 2
\]
\[
\frac{1}{\sqrt{n}} = \frac{2}{(12)(1.96)}
\]
\[
n = 138.2976
\]

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

(c)
\[
z_{0.025} \frac{\sigma}{\sqrt{n}} = e
\]
\[
1.96 \frac{\sigma}{\sqrt{n}} = e
\]
\[
\frac{1}{\sqrt{n}} = \frac{e}{1.96\sigma}
\]
\[
n = (1.96\frac{\sigma}{e})^2
\]

(d)
\[
n = (1.96\frac{12}{1})^2
\]
\[
= [(1.96)(12)]^2
\]
\[
= 553.1904
\]

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.
(a)

\[ \bar{x} \pm t_{0.025} \frac{s}{\sqrt{n}} \]

\[ 148000 \pm 2.06 \frac{62000}{\sqrt{25}} \]

\[ (122456, 173544) \]

(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)

\[ \bar{x} = 99.8 \]
\[ s \approx 54.65 \]

\[ 99.8 \pm 2.78 \frac{54.65}{\sqrt{5}} \]

\[ (31.86, 167.74) \]

(b)

\[ \bar{x} = 50(99.8) = 4990 \]
\[ s \approx 50(54.65) \approx 2732.5 \]

\[ 4990 \pm 2.78 \frac{2732.5}{\sqrt{5}} \]

\[ (1592.8, 8387.2) \]

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

8-8 (p. 264)
(a)

\[ \bar{x} = 44.2 \]
\[ s \approx 35.65 \]

\[ 44.2 \pm 2.78 \frac{35.65}{\sqrt{5}} \]

\[ (-0.12, 88.5) \]
(b) 

\[ \bar{x} = 2210 \]

\[ s \approx 1782.3 \]

\[ 2210 \pm 2.78 \frac{1782.3}{\sqrt{5}} \]

\[ (-5.9, 4425.9) \]

(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:

\[ \bar{x} = 32.2(50) = 1610 \]

\[ s \approx 1411.3 \]

\[ 1610 \pm 2.78 \frac{1411.3}{\sqrt{5}} \]

\[ (-144.6, 3364.6) \]

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.