SOLUTIONS => Point Estimate & Confidence Interval Questions

1. $n = 47$
$\mu = 230$
$\sigma = 23$
$\bar{x} = 236$

a) $\bar{x} \pm z\frac{\sigma}{\sqrt{n}}$

$236 \pm 1.645\ \frac{23}{\sqrt{47}}$

236 ± 5.52

The 90% confidence interval is between 230.48 and 241.52.

b) $\bar{x} \pm z \frac{\sigma}{\sqrt{n}}$

$236 \pm 1.96 \frac{23}{\sqrt{47}}$

236 ± 6.58

The 95% confidence interval is between 229.42 and 242.58.

c) $\bar{x} \pm z \frac{\sigma}{\sqrt{n}}$

$236 \pm 2.56 \frac{23}{\sqrt{47}}$

236 ± 8.59

The 99% confidence interval is between 227.41 and 244.59.

d) As the confidence level increases, the confidence interval gets wider.

e) The 90% confidence interval (230.48 to 241.52) does not enclose the population mean of 230.
In general, not all confidence intervals enclose the population mean.

2. $\mu = 168$
$\sigma = 15$
$n = 40$

a) $\bar{x} = \frac{6652}{40}$

$\bar{x} = 166.3$

b) The sample mean of 166.3 is considered a point estimate.

c) $\bar{x} \pm z\frac{\sigma}{\sqrt{n}}$

$166.3 \pm 1.96\frac{15}{\sqrt{40}}$

166.3 ± 4.65

The 95% confidence interval is between 161.65 and 170.95.

d) The 95% confidence interval is an interval estimator.

e) The 95% confidence interval (161.65 to 170.95) does enclose the population mean of 168.

f) The method that produced this interval from 161.65 to 170.95 has a 0.95 probability of producing a confidence interval that encloses the population mean.

3. $n = 72$
$\bar{x} = 232$
$S_x = 18$

$$\bar{x} \pm z \frac{S_x}{\sqrt{n}}$$

$$232 \pm 1.645 \frac{18}{\sqrt{72}}$$

$$232 \pm 3.49$$

The 90% confidence interval is between 228.51 and 235.49.
The method that produced this interval has a 0.90 probability of producing a confidence interval that encloses the population mean.

4. $n = 56$
$\bar{x} = 14.7$
$S_x = 1.3$

$$\bar{x} \pm z \frac{S_x}{\sqrt{n}}$$

$$14.7 \pm 1.96 \frac{1.3}{\sqrt{56}}$$

$$14.7 \pm 0.34$$

The 95% confidence interval is between 14.36 and 15.04.

5. $n = 60$

$\bar{x} = 6.1$

$S_x = 0.4$

$$\bar{x} \pm z \frac{S_x}{\sqrt{n}}$$

$$6.1 \pm 1.645 \frac{0.4}{\sqrt{60}}$$

$$6.1 \pm 0.09$$

The 90% confidence interval is between 6.02 and 6.19.
The method that produced the interval from 6.02 and 6.19 has a 0.90 probability of producing a confidence interval that encloses the population mean.

6. $n = 67$
$\bar{x} = 23.7$
$S_x = 3.2$

$$\bar{x} \pm z \frac{S_x}{\sqrt{n}}$$

$$23.7 \pm 2.56 \frac{3.2}{\sqrt{67}}$$

$$23.7 \pm 1.00$$

The 99% confidence interval is between 22.7 and 24.7.