Ch. 7 HW 1, 2, 5, 7, 8, 10, 11, 16, 19, 20, 24, 26, 30

1. a) Collection of sample means for all the possible random samples of a particular size that can be obtained from a population.
b) Mean of the distribution of sample means will equal population mean.
c) Standard deviation of the distribution of sample means

2. A sampling distribution is a distribution of statistics obtained by selecting all the possible samples of a specific size from a population. The distribution of scores are actual scores not statistics as with a sampling distribution.

3. a) Standard deviation, \( \sigma = 30 \), measures standard distance between a score and the population mean.
b) The standard error, \( \sigma_x = \frac{30}{\sqrt{100}} = 3 \), measures the standard distance between a sample mean and population mean.

4. a) \( \left[ \frac{n \geq 9}{10} \right] = 30 \sqrt{\frac{1}{n}} 
  \]
b) \( \left[ \frac{n \geq 36}{5} \right] = 30 \sqrt{\frac{1}{n}} 
  \]
c) No, when \( n = 1 \), \( \sigma_x \) is equal to \( \sigma \). For any other sample size, the \( \sigma_x \) will be smaller than the \( \sigma \).

5. a) st. dev. \( \sqrt{1} = 1 
  \]
b) \( n = 9 \), \( \sigma_x = 2 \), \( \sigma_x = \frac{6}{\sqrt{9}} 
  \]
c) \( \sigma_x = \frac{6}{136} = 1 
  \]

6. a) \( \sigma = 8 \), \( z = \frac{106 - 100}{8} = .75 \), \( p = .2266 \) * more likely to occur
b) \( \sigma_x = 2.67 \), \( z = \frac{103 - 100}{2.67} = 1.13 \), \( p = .1319 \) * less likely to occur
1. a) \[ n = 100 \]

b) \[ z = \pm 1.96 \]
\[ 1.96 = \frac{\bar{x} - 100}{s} \]
\[ -1.96 = \frac{\bar{x} - 100}{s} \]
\[ \bar{x} = 107.84 \]
\[ \bar{x} = 92.16 \]

c) \[ z = \frac{100 - 100}{s} = 1.5 \] *This is not in the extreme 5%

16. a) \[ \mu \pm 1 \sigma \]
\[ \mu \pm 2 \sigma \]
\[ \mu \pm 3 \sigma \]

b) \[ \frac{\bar{x}}{10} = 2 \]
\[ 2 = \frac{55 - 50}{\sigma} \]
\[ 2 = 55 - 50/2 = 2.5 \]
\[ \bar{x} = \frac{10}{25} = 0.4 \]
\[ \bar{x} = \frac{10}{100} = 0.1 \]

19. a) \[ \sigma_{\bar{x}} = \frac{2}{\sqrt{n}} \]
\[ \sigma_{\bar{x}} = \frac{1}{\sqrt{n}} \]

b) \[ \sigma_{\bar{x}} = \frac{1}{\sqrt{100}} \]

20. a) Random sample of \( n = 4 \) is not normal

b) \[ \sigma_{\bar{x}} = \frac{18}{3} \]
\[ 2 = \frac{88 - 85}{1.00} \]
\[ \sigma = 15.87 \]

*It is not likely that a sample would be greater than 88 b/c of the large \( n \), sample means will be close to the population
(24) a) \(10 = 20 \sqrt{n} \quad \sqrt{n} > 4\)

b) \(5 = 20 \sqrt{n} \quad \sqrt{n} > 16\)

(26) a) \(\mu = 39.7 \quad \sigma = 11.8 \quad \frac{0.7}{\sqrt{12}} = 3.41 \quad 2 = 3.14 \quad \rho = 0.0008\)

b) Not a random sample because the sample mean is much larger than expected for a sample of \(n=12\) than the population mean.

\[\begin{align*}
\text{X # of migraines} & \quad 30 & \quad 25 & \quad 20 & \quad 15 & \quad 10 & \quad 5 \\
0 & \quad 10 & \quad 20 \\
\text{Dose of Drug (mg)} & \end{align*}\]