Chapter 7: Sampling Distributions

Key Vocabulary:

- parameter
- statistic
- sampling variability
- sampling distribution
- population distribution
- biased estimator
- unbiased estimator
- bias
- variability
- variability of a statisic
- sample proportion
- mean and standard deviation of sampling distributions
- central limit theorem

7.1 What Is a Sampling Distribution? (pp.414-428)

1. Explain the difference between a *parameter* and a *statistic*?

2. What is *sampling variability*?

3. Explain the difference between μ and $\bar{x}$, and between p and $\hat{p}$?

4. What is meant by the *sampling distribution* of a statistic?

5. What is *population distribution*?

6. What is the difference between the distribution of the population, the distribution of the sample, and the sampling distribution of a sample statistic?

7. When is a statistic considered an *unbiased estimator*?

8. What is *biased estimator*?

9. How is the size of a sample related to the *spread* of the sampling distribution?

10. The *variability of a statistic* is…

11. Explain the difference between *bias* and *variability*.

7.2 Sample Proportions (pp.432-438)

1. What is the purpose of the *sample proportion*?

2. In an SRS of size n, what is true about the sampling distribution of $\hat{p}$ when the sample size n increases?

3. In an SRS of size n:
   a. What is the mean of the sampling distribution of $\hat{p}$?
   b. What is the standard deviation of the sampling distribution of $\hat{p}$?

4. What happens to the standard deviation of $\hat{p}$ as the sample size n increases?

5. When does the formula $\sqrt{\frac{p(1-p)}{n}}$ apply to the standard deviation of $\hat{p}$?

6. When the sample size n is large, the sampling distribution of $\hat{p}$ is approximately Normal. What test can you use to determine if the sample is large enough to assume that the sampling distribution is approximately normal?

7.3 Sample Means (pp.442-452)

1. What are the mean and standard deviation of the sampling distribution of the sample mean $\bar{x}$? Describe the conditions for these formulas.

2. Explain how the behavior of the sample mean and standard deviation are similar to the sample proportion.

3. The mean and standard deviation of a population are *parameters*.
What symbols are used to represent these *parameters*?

4. The mean and standard deviation of a sample are *statistics*.
What symbols are used to represent these *statistics*?

5. The shape of the distribution of the sample mean depends on …

6. Because averages are less variable than individual outcomes, what is true about the standard deviation of the sampling distribution of $\bar{x}$?

7. What symbols are used to represent the mean and standard deviation of the sampling distribution of $\bar{x}$?

8. What is the mean of the sampling distribution of $\bar{x}$, if $\bar{x}$ is the mean of an SRS of size n drawn from a large population with mean μ and standard deviation σ?

9. What is the standard deviation of the sampling distribution of $\bar{x}$, if $\bar{x}$ is the mean of an SRS of size n drawn from a large population with mean μ and standard deviation σ?

10. When should you use $\frac{\sigma}{\sqrt{n}}$ to calculate the standard deviation of $\bar{x}$?

11. What is the *Central Limit Theorem*?