Chapter 18: Sampling Distribution Models

Key Vocabulary:

- parameter
- statistic
- proportion
- sampling distribution model
- Central Limit Theorem
- Standard error

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

2. Explain the difference between p and $\hat{p}$?

3. What is meant by *sampling variability*?

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

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

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

7. In an SRS of size n, what is the mean of the sampling distribution of $\hat{p}$?

8. In an SRS of size n, what is the standard deviation of the sampling distribution of $\hat{p}$?

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

10. When does the formula $\sqrt{\frac{pq}{n}}$ apply to the standard deviation of $\hat{p}$?

11. 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?

12. The mean and standard deviation of a population are *parameters*.

    What symbols are used to represent these *parameters*?

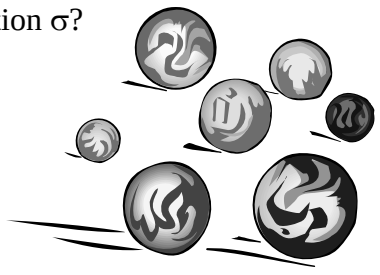
13. The mean and standard deviation of a sample are *statistics*.

    What symbols are used to represent these *statistics*?

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

15. 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?

16. 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?



17. To cut the standard deviation of $\bar{x}$ in half, you must take a sample _____ times as large.

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

19. If σ is not known, what can you use to estimate the standard deviation of $\bar{x}$? What is this called?

20. What does the central limit theorem say about the shape of the sampling distribution of $\bar{x}$?

21. What does the law of large numbers state?

Chapter 19: Confidence Intervals for Proportions

Key Vocabulary:

- standard error
- confidence level
- confidence interval
- margin of error
- critical value
- one-proportion z-interval

Calculator Skills:

- 1-PropZInt

1. Describe the *sampling distribution model* of $\hat{p}$. What *assumptions* must you make for this description to be reasonable?

2. What is the *standard error* of $\hat{p}$? When would you use *standard error* in place of *standard deviation*?

3. Explain the meaning of the following statement: "We are 95% *confident* that between 42.1% and 61.7% of sea fans are infected."

4. What is meant by a *confidence interval*?

5. What is the general form of a *confidence interval* for a one-proportion z-interval?

6. Explain how to calculate *margin of error*.

7. As the *confidence level* increases, what happens to the *margin of error*? What happens to the *confidence interval*?

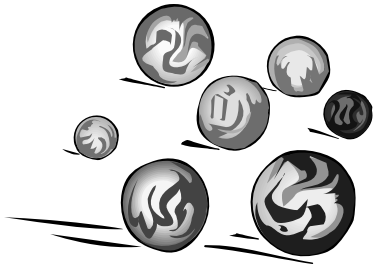
8. By how many times must the sample size *n* increase in order to cut the *margin of error* in half?

9. Why is it best to have high *confidence* and a small *margin of error*?

10. What is the *critical value* z^* for a 90% *confidence interval*? Draw a sketch.

11. What is the *critical value* z^* for a 95% *confidence interval*? Draw a sketch.

12. What is the *critical value* z^* for a 99% *confidence interval*? Draw a sketch.



13. What assumptions and conditions must you consider before creating a *confidence interval* for a proportion?

14. What effect does increasing your sample size have on the *margin of error*? What effect does it have on the *confidence level*? What effect does it have on the *confidence interval*?

15. The formula used to determine the sample size *n* that will yield a confidence interval for a population proportion with a specified margin of error *m* is $m = z^* \sqrt{\frac{\hat{p}\hat{q}}{n}}$. Solve for *n*.

Chapter 20: Testing Hypotheses About Proportions

Key Vocabulary:

- hypothesis
- null hypothesis
- reject (the null hypothesis)
- fail to reject (the null hypothesis)
- alternative hypothesis

Calculator Skills:

- 1-Prop ZTest

1. What is a *hypothesis*?

2. After analyzing a set of data, if the results support a *hypothesis,* does that prove the *hypothesis* is true? Explain.

3. After analyzing a set of data, if the results are inconsistent with a *hypothesis,* does that prove the *hypothesis* is false? Explain.

4. What does it mean to *reject* a *hypothesis*?

5. When testing *hypotheses*, always start by assuming that the *null hypothesis* is true. What is meant by a *null hypothesis*?

6. Given a *null hypothesis* $H_0 : p = p_0$, what are the parameters of the Normal sampling distribution model? Under what conditions is this model appropriate?

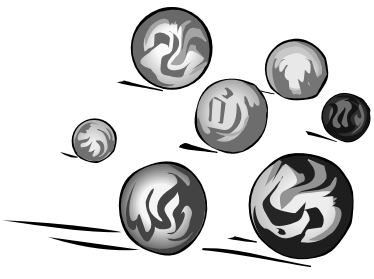
7. How would you determine whether a particular value of $\hat{p}$ is so unlikely to have occurred (assuming $p = p_0$) that you would *reject* the *null hypothesis*?

8. Why do we say we "*fail to reject*" the *null hypothesis* rather than "accept" the *null hypothesis*?

9. What is meant by an *alternative hypothesis*?

10. What is meant by a P-value?

11. Explain the difference between a two-sided alternative hypothesis and a one-sided alternative hypothesis. Draw a sketch



Chapter 21: More About Tests

Key Vocabulary:

- P-value
- statistically significant
- alpha level
- significance level
- Type I Error
- Type II Error
- power

1. Explain what the *p-value* represents.

2. What is meant by an *alpha level*?

3. What does it mean for a result to be *statistically significant*?

4. A 95% confidence interval corresponds to a two-sided hypothesis test at what *alpha level*?

5. A 90% confidence interval corresponds to a one-sided hypothesis test at what *alpha level*?

6. Explain the difference between a *Type I* and *Type II Error*.

7. What is the probability of a *Type I Error*?

8. What is meant by the *power* of a test?

9. How do you calculate the *power* of a test?

Chapter 22: Comparing Two Proportions

Key Vocabulary:

- pooling

Calculator Skills:

- 2-Prop Z-Int
- 2-Prop Z-Test

1. What conditions and assumptions are necessary for the sampling model of $\hat{p}_1 - \hat{p}_2$ to be approximately Normal?

2. If the above conditions and assumptions are met, what is the mean and standard deviation of the sampling model?

3. Describe how to construct a level C confidence interval for the difference between two proportions, $p_1 - p_2$.

4. Explain what is meant by pooling two samples. When is it appropriate to pool samples?

5. For a two-sample hypothesis test where $H_0 : p_1 - p_2 = 0$, show how to calculate the z test statistic?