

Algebra 2B/Trig. Unit 7: Statistical Inference Test Review

	Formula/ How do you find them?	The meaning of the value
Standard Deviation of sampling distribution		
Margin of Error		
Normalcy Condition		

Vocabulary

Vocabulary	Definition	Example/ note/symbols
Null Hypothesis		
Alternate Hypothesis		
Critical Value		

1. A popcorn manufacturer puts a prize in 25% of its bags of popcorn. When sampling from this population, consider, “successes” to be bags of popcorn containing a prize.
 - a. For random samples of 100 bags of popcorn, what is the 95% confidence interval of the sampling distribution?
 - b. For random samples of 80 bags of popcorn, what is the 80% confidence interval of the sampling distribution?

2. Hunter surveys a random sample of 64 students at his community college and finds that 37.5% of the students saw a film at the local movie theater in the last 30 days. Find a 90% confidence interval for the proportion of all students at the community college who saw a film at the movie theater in the last 30 days.

3. Caiden manages the security team at a large airport and surveys a random sample of 149 travelers. He finds that the mean amount of time that it takes passengers to clear security is 28.3 minutes. From past experience, Caiden estimates that the population standard deviation is 6.4 minutes. Find a 90% confidence interval for the mean amount of time that it takes passengers to clear security.

4. Tyler is a manager at a utility company and wants to know the mean amount of electricity that residential customers consumes per month. He is aiming for a 90% confidence interval and a margin of error of 10kWh. From past experience, Tyler estimates that the population standard deviation is 91.1 kWh. What sample size n should he use?

5. For the following scenarios, state if the conditions for Normalcy are met. Show math to support your answer.
 - a. 200 teenage boys were surveyed about the number of hours they spend each week playing video games. The sample mean was 11.7 hours and the standard deviation was 3.4 hours.
 - b. 25 teenage girls were surveyed about the number of hours they spend each week listening to music. The sample mean was 9.2 hours and the standard deviation was 2.7 hours.
 - c. Legislators have been trying to increase public support for the construction of a new bridge. 561 out of 1100 people that were polled said they supported the project.
 - d. Roosevelt High School is considering a requirement for all 1300 students to wear uniform to school. Of the 30 parents surveyed by the school, 22 said they were in favor of mandatory school uniforms.

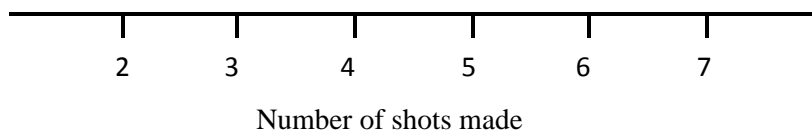
A basketball player claims to make 60% of her shots from the field. We want to simulate the player taking sets of 10 shots, assuming her claim is true.

6. To simulate the number of makes in 10 shot attempts, how would perform the simulation using a random number generator

7. Twenty repetitions of the simulation were performed. The simulated number of makes in each set of 10 shots were recorded as follows:

Stimulation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Total shots made	2	3	4	5	4	5	4	4	5	5	6	5	5	4	4	6	8	1	3	7

8. Create a dot plot



What is the approximate probability at a 55% shooter makes **6 or more shots** in 20 attempts?

9. State your conclusion:

10. An unbiased survey of 500 high school students at a school reports that 30% students work part time. What is the 95% confidence interval for the population proportion?

11. A manufacturer advertises that one bag of candies contain 200 candies. Some customers suspect the average number of the candies is considerable less and decide to conduct an experiment to find out. State the null AND alternative hypotheses to be tested.

12. A research company conducted a survey on how many high school students in California have cell phones. Based on data, they estimate that $p = .8$. They are aiming for a 98% confidence interval and a margin of error of 2%.

a) What sample size n should they use?

b) What's the population?

13. State if the following satisfy the Normalcy condition (In other words, is it worth of my time to look at the research). Show your work.

a. You survey a random sample of 20 freshmen students at a high school and 40% of them said they have had a part time job in their first year of high school already

Normalcy condition (circle one): Yes No

Your work: _____

b. You survey a random sample of 1000 students at a large high school and find that 30% of the students have attended a school baseball game.

Normalcy condition (circle one): Yes No

Your work: _____

State the critical value (z-score) for the given confidence level.

Confidence level	95% confident	90% confident	80% confident
Critical value			

14. Suppose that a quarterback has 70% completion rate. Which event would be more surprising:

{a} In a game where he threw 50 passes, completing 10 of them. Or

{b} In a game where he only threw 40 passes, completing 30 of them.

Explain.

15. A survey of 520 high school students reports that 30% of the students would like to be able to take a college course at an local community college to get a college credit course.

a. Calculate the **standard deviation** of the sampling distribution to the nearest thousandth.

b. Determine the 95% confidence **interval** for the population proportion. Interpret.

16. In a survey conducted at Santa Clarita Valley high schools, students were asked how many hours per week they spend on extra curricular activities. In a sample of **200 freshman**, the sample mean was 15 hours and the sample standard deviation was 2.2 hours. In a sample of **200 seniors**, the sample mean was 18 hours and the sample standard deviation was 3.4 hours.

a. Calculate the standard deviation of the sampling distribution for **freshman**.

b. Calculate and interpret the 90% confidence **interval** for **freshmen**.

c. Estimate the margin of error for **freshmen** with 90% confidence.

d. Calculate and interpret the 90% confidence **interval** for **seniors**.

17. In Isaac's science class today, there is a pop quiz consisting of 20 multiple choice questions (each have four answer choices). Since he has not done any reading or homework for this class in three months, he plans to randomly guess on each of the 20 questions. Design a simulation to represent the 20 question pop quiz.

18. A credit card company wondered whether giving frequent flyer miles for every purchase would increase card usage, which has a current mean of \$2500 per year. They gave free miles to a SRS of 51 credit card customers and found the sample mean to be \$2542. Assume the population standard deviation is \$109. Test this at a significance level of 0.01.

a. State the null and alternative hypothesis.

b. Sketch the critical region and state the z-score (critical value).

c. Calculate the z- statistic.

d. Reject or Fail to Reject.

e. State your conclusion.