Lesson 11: Inference for One Mean Sigma unknown

Homework

Instructions: You are encouraged to collaborate with other students on the homework, but it is important that you do your own work. Before working with someone else on the assignment, you should attempt each problem on your own.

Problems

1. Compare the t-score to the z-score. What is the primary difference between the two scores?

2. The null hypothesis is $H_o : \mu = 24$ and the alternative hypothesis is $H_a : \mu > 24$ and the population standard deviation σ is not known. You collect a sample of size n $= 18$ and compute a mean of $\bar{x} = 27$ and a standard deviation of s $= 8$. Compute the t-score using this information.

Shane Goodwin and other researchers studied factors that affect a student's confidence on a multiple-choice mathematics exam. A group of n $= 139$ students in an Intermediate Algebra course at BYU-Idaho participated in the study. In addition to marking their test question responses, they evaluated their confidence for each question on a scale of 1 to 6:

Score	Description
1	Random guess (no clue)
2	Very unsure
3	Somewhat unsure
4	Somewhat sure
5	Very Sure
6	Certain (absolutely sure)

Confidence ratings were not relayed to the instructor, and they did not affect the grade on the exam. The mean confidence rating marked by each student is given together with their score on the exam. (The maximum score possible on the exam was 100 points.) Open the data file MathSelfEfficacy. Use this information to answer questions 3 through 5.

3. What is the mean score on the exam earned by the n $= 139$ students in the sample?

4. Find and interpret a 95% confidence interval for the true mean score on this Intermediate Algebra exam.

5. Find and interpret a 95% confidence interval for the true mean confidence rating expressed by students on this Intermediate Algebra exam.

Two years ago in a similar study, the mean student confidence rating (on a scale from 1 to 6) was found to be 4.12. We want to know if the mean confidence rating of math students has gone up in the last two years. Do a hypothesis test to see if the new study has a mean student confidence rating that is significantly higher than two years ago. Use 0.05 as your level of significance. Use this information to answer questions 6 through 12.

6. What are the requirements that should be met to conduct this hypothesis test? Are they met?

7. State the null and alternative hypotheses.

8. Compute the sample test statistic.

9. State the degrees of freedom.

10. Find the P-value and compare it to the level of significance. Sketch the t-distribution using the t-distribution applet.

11. State your decision. Do we reject the null hypothesis or fail to reject it?

12. State your conclusion in an English sentence, relating the result to the context of the problem.

A group of students carefully scraped the white filling (the "Stuf") from traditional and DoubleStuf Oreo cookies. They took about 50 samples of each type of cookie and measured (in grams) the amount of stuffing in each cookie to determine if DoubleStuf Oreos really contain "double" the amount of filling. Open the data file OreoDoubleStuf. Use this information to answer questions 13 through 15.

13. Find and interpret a 90% confidence interval, after calculating the margin of error, for the true mean weight of the filling in traditional Oreo cookies.

14. Find and interpret a 90% confidence interval, after calculating the margin of error, for the true mean weight of the filling in DoubleStuf Oreo cookies.

15. Based on your observations in this exercise, would you say that DoubleStuf Oreo cookies actually contain double the filling compared to traditional Oreo cookies? Justify your answer.