Lesson 10: Inference for One Mean - Sigma Known (Confidence Interval)

Preparation

Directions: Please fill in Part I as you study the Reading Assignment. Once you finish the reading, complete the questions on Part II. You may use your notes, the key, and the help videos. Be sure to take this completed assignment to your group meeting where you can ask and help answer questions on this assignment.

Problems

Part I: Use the information in the reading assignment to complete these questions.

1. What is a confidence interval?
2. What is the margin of error in a confidence interval when estimating the population mean? This question is not asking for the formula, but rather what length it represents in the confidence interval.
3. Assuming you know σ, what is the general formula for a confidence interval used to estimate the population mean.
4. What are the assumptions for creating a confidence interval for a single mean with sigma known?
5. Open up your Normal Probability Applet and answer the following questions.
    a. Go the Normal Probability Applet and type in .90 for the area. Shade the middle area under the curve-leaving the two tails un-shaded. Record the positive z-score below to the nearest hundredth.
    b. Go the Normal Probability Applet and type in .95 for the area. Shade the middle area under the curve-leaving the two tails un-shaded. Record the positive z-score below to the nearest hundredth.
    c. Go the Normal Probability Applet and type in .99 for the area. Shade the middle area under the curve-leaving the two tails un-shaded. Record the positive z-score below to the nearest hundredth.
    d. What happens with the z-score as the area in the middle under the normal curve increases?

Part II :

6. What are the three assumptions that need to be checked before you compute a confidence interval for a mean?

The Graduate Management Admission Test (GMAT) is used as an admission criterion in many masters of business administration (MBA) programs. A BYU-I professor would like to estimate the population mean from a simple random sample of 50 people's scores. The sample mean for these 50 students is 541. Assuming a population standard deviation, σ, of 32, answer the following questions:

7. What is the point estimate for the population mean?

8. Create a 95% confidence interval for the population mean. Show all your work below.

9. Say that the sample size changes to n=100. Compute a 95% confidence interval with the same point estimate.

10. How does the Margin of Error for the 95% confidence interval of sample size 50 compare to the margin of error for the 95% confidence interval of sample size 100?

11. Create a 90% confidence interval for the original 50 students.

12. How does the margin of error for the 95% confidence interval that you computed in question 8 compare to the margin of error for the 90% confidence interval that you computed in question 11?

13. The BYU-I professor would like to repeat the experiment, but he wants to make sure he has enough students in his sample to ensure that his Margin of Error is 5. How many students will need to be in his sample to ensure he has this level of accuracy for a 95% confidence interval?