Statistics—2017 **Name_____**

➢ Confidence Interval for population mean/proportion

A hardware manufacturer produces bolts used to assemble various machines. Assume that the diameter of bolts produced by this manufacturer has an unknown population mean $\boldsymbol{\mu}$ and the standard deviation is 0.1 mm. Suppose the average diameter of a simple random sample of 50 bolts is 5.11 mm.

A. Calculate the margin of error of a 95% confidence interval for $\boldsymbol{\mu}$.

B. What is the width of a 95% confidence interval for $\boldsymbol{\mu}$?

You want to rent an unfurnished one-bedroom apartment in Boston next year. The mean monthly rent for a simple random sample of 32 apartments advertised in the local newspaper is $1,400. Assume that the standard deviation is known to be $220.

A. Find a 99% confidence interval for the mean monthly rent for unfurnished one-bedroom apartments available for rent in this community.

B. Does the confidence interval give us information about the statistic or the parameter?

C. How to interpret a 99% confidence interval for the mean.
(Select the best statement)
   (a) 99% of the intervals constructed using this process based on same-sized samples from this population will include the sample mean.
   (b) 99% of the possible sample means
   (c) 99% of the intervals constructed using this process based on same-sized samples from this population will include the population mean.
   (d) 99% of the possible population means will be included by the interval.

D. What if the sample size was 40 for the 99% confidence interval in (a). How would the confidence interval change with this larger sample size? No calculations necessary.
(Select the best statement)
   (a) The confidence interval would be the same width but shifted to the left
   (b) The confidence interval would be the same width but shifted to the right
   (c) The confidence interval would have the same center but be wider
   (d) The confidence interval would have the same center but be narrower

The *New York Times* and CBS News conducted a nationwide poll of 1048 randomly selected 13- to 17-year-olds. We can consider the sample to be a SRS.

A. Of these 1048 teenagers, 692 had a television in their room. Give a 95% confidence interval for the proportion of all people in this age group who had a TV in their room at the time of the poll

B. Of the 1048 teens surveyed, 189 named Fox as their favorite television network. Give a 90% confidence interval for the proportion of all people in this age group who would choose Fox as their favorite network.

C. Suppose you were to change the confidence level in (b) to 95% using the same sample. How would the confidence interval change? No calculations necessary.

We have IQ test scores of 31 seventh-grade girls in a Midwest school district. We have calculated that sample mean is 105.84 and the standard deviation is 14.27.

A. Give a 99% confidence interval for the average score in the population. What is the margin of error?

More Confidence Interval Practice

Show relevant work for each question:

1. A company that produces white bread is concerned about the distribution of the amount of sodium in its bread. The company takes a simple random sample of 100 slices of bread and computes the sample mean to be 103 milligrams of sodium per slice.

Construct a 99% confidence interval for the unknown mean sodium level assuming that the population standard deviation is 10 milligrams.

2. Fill in the blanks with one of the following: *increases, decreases,* or *stays the same* where $E = \frac{z^* \sigma}{\sqrt{n}}$.

a) As the sample size (n) increases, the margin of error (E) _____.

b) As the confidence level (C) increases, the margin of error (E) _____.

c) As the standard deviation (σ) increases, the margin of error (E) _____.

3. You work for a consumer advocate agency and want to find the mean repair cost of a washing machine. In the past, the standard deviation of the cost of repairs for washing machines has been $17.50. As part of your study, you randomly select 40 repair costs and find the mean to be $100.00.

Calculate a 90% confidence interval for the population mean.

4. The actual time it takes to cook a ten pound turkey is a normally distributed. Suppose that a random sample of 19 ten pound turkeys is taken.
   Given that an average of 2.9 hours and a standard deviation of .24 hours was found for a sample of 19 turkeys, calculate a 90% confidence interval for the average cooking time of a ten pound turkey.

5. The football coach randomly selected eight players and timed how long it took to perform a certain drill. The times in minutes were:

10	6	8	7
6	5	7	8

Assuming that the times follow a normal distribution, find a 95% confidence interval for the population mean