

# Lesson 11: Inference for One Mean; Sigma unknown (Hypothesis Test)

## Preparation

**Directions:** Please fill in Part II 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. List at least three characteristics of the Student's t-distribution.
2. How many degrees of freedom generally does the t-distribution have when it is used for inference for a single mean?
3. What is the formula for the one-sample t confidence interval (confidence interval for  $\mu$  when  $\sigma$  is unknown)?
4. What are at least two differences between the one-sample t confidence interval and the one sample z confidence interval we covered in Lesson 10?
5. When conducting a hypotheses test for a single mean with sigma unknown, what is formula used to compute the test statistic?
6. What are the requirements that need to be met to conduct a hypotheses test for a single mean when sigma is unknown?
7. Go to Part II. Using your calculator or Excel, compute the sample mean and sample standard deviation for the 15 pieces of data you see in Part II. Write your numbers here and take them to your group preparation meeting.

## Part II :

A study by the National Association of Realtors reported in 2004 that second-home sales accounted for more than a third of residential real estate transactions. According to the report, the average age of a person buying a second home as an investment rental property was 47 years. A real estate agent wants to estimate the average age of those buying investment properties in his area. He randomly selects 15 of his clients who purchased an investment property. Their ages are

27,35,38,49,55,58,56,50,51,45,46,56,49,48,38.

8. What are the requirements for creating a 95% confidence t-interval?
9. With the data above, calculate the margin of error and create a 95% confidence interval to estimate the mean age of all clients who buy an investment property. Input the numbers you computed in #7 of part I into the confidence interval formula. Show your work below. The t-score for a 95% confidence interval from the t-distribution with 14 degrees of freedom is 2.1448. Round your upper and lower bound to one decimal place, but do not do this rounding until you have done all your computations.

10. Now create a 99% confidence interval to estimate the mean age of all the clients who built an investment property. Follow the same rounding rules as above. The t-score for a 99% confidence interval from the t-distribution with 14 degrees of freedom is 2.9768.
11. Now using your class software compute:
  - a. The 95% confidence interval using the data above.
  - b. The 99% confidence interval using the data above.
12. How does the margin of error of the 95% confidence interval compare to the 99% interval?
13. Rather than estimating the age of his clients that buy investment properties, the realtor agent would like to test the claim that the age of his clients is different than the national average of age 47. Use the 0.05 as your level of significance. Follow the following sequence of steps. Fill in your answers at each step and show all your work.
  - a. State the Null and Alternative Hypothesis
  - b. Compute the test statistic. First compute it using the formula and showing your work below. Then check this test statistic by inputting the data into the software.
  - c. State the Degrees of Freedom:
  - d. Sketch the t-distribution and shade the area which represents the P-value.
  - e. Use your Software to compute the P-value.
  - f. State your decision. Do you reject the null hypothesis or fail to reject at the 0.05 level of significance?
  - g. Present your conclusion in an English sentence, relating the result to the context of the problem.