STAT 301 – Excel Homework 6 (Chapter 10)

Note – This assignment has 25 points available. Your score will be scaled down to a number out of 10 points.

Goal – To use Excel to perform a test of hypotheses concerning the means of two populations.

Excel functions

- 2-sample Z-test (Independent samples, σ_1^2 and σ_2^2 known) – From the menu select: **Data → Data Analysis → z-Test: Two Sample for Means**

- Pooled T-test (Independent samples, σ_1^2 and σ_2^2 unknown but equal) – From the menu select: **Data → Data Analysis → t-Test: Two-Sample Assuming Equal Variances**

- Paired T-test (Dependent samples) – From the menu select: **Data → Data Analysis → t-Test: Paired Two Sample for Means**

Problem 1 – The time it takes for general anesthesia to work (time to induction) is an important consideration during an emergency and for scheduled surgeries. Recently, a study was conducted to compare the mean induction time of similar drugs administered via (1) inhalation and (2) intravenously. Independent random samples of patients requiring general anesthesia were obtained, and the induction times (in minutes) were measured. The data is in the file Excel Homework 6 – Problem 1. Assume the variance in induction time for inhalation administration is $\sigma_1^2 = 0.0625$ and for intravenous administration is $\sigma_2^2 = 0.1225$. Is there any evidence to suggest that the mean time to induction for inhalation administration is more than the mean time to induction for intravenous administration? Use $\alpha = 0.05$.

Create the Output [2 points]
- Download the data file from the Blackboard page for the course.
- Make your header – enter your name and information into cells A1 to A5 (just as you did for the previous Excel homework assignments).
- Use the appropriate Excel function to produce the needed output. Position the output to the right of the data (e.g. cell D7). Also, widen the columns so all the information can be read and make sure the output will fit on one page.

Questions – write your answers to the following directly on your output. Be neat and label your answers.
   (a) Give the null and alternative hypotheses. [1 point]
   (b) Find and circle the test statistic and the p-value for this test. [1 point]
   (c) Give the decision for the test. Write a conclusion that relates your decision to the context of the problem. [2 points]

Problem 2 – Low-carbohydrate foods are very popular as many Americans try to avoid this sugar and starch combination that many believe causes weight gain. An advertisement for a low-carb ice cream claims that the product has 16 fewer grams of carbohydrates per serving than the leading store brand. To check this claim, independent random samples of each type of ice cream were obtained, and the amount of carbohydrates in each serving was measured. The data is in the file Excel Homework 6 – Problem 2. The variance in carbohydrates per serving for the (1) store brand is known to be 8.5 and for the (2) low-carb brand it's known to be 0.253. Is there any evidence to suggest that the difference in population means of carbohydrates per serving is not 16 grams? Use $\alpha = 0.05$.

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- Use the appropriate Excel function to produce the needed output. Position the output to the right of the data (e.g. cell D7). Also, widen the columns so all the information can be read and make sure the output will fit on one page.

Questions – write your answers to the following directly on your output. Be neat and label your answers.
- (a) Give the null and alternative hypotheses. [1 point]
- (b) Find and circle the test statistic and the p-value for this test. [1 point]
- (c) Give the decision for the test. Write a conclusion that relates your decision to the context of the problem. [2 points]

Problem 3 – The tiny quagga mussels have invaded at least 600 bodies of water in the United States and are causing many problems. These mollusks disrupt the natural food chain, clog pipes, cling to machinery, and foul water-delivery systems. A random sample of quagga mussels was obtained from (1) Lake Texoma and (2) Lake Mead, and the size of each (in cm) was carefully measured. The data is in the file Excel Homework 6 – Problem 3. Is there any evidence to suggest that the population mean size of quagga mussels is larger in Lake Texoma than in Lake Mead? Assume the underlying distributions are normal with equal population variances. Use $\alpha = 0.05$.

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- Use the appropriate Excel function to produce the needed output. Position the output to the right of the data (e.g. cell D7). Also, widen the columns so all the information can be read and make sure the output will fit on one page.

Questions – write your answers to the following directly on your output. Be <u>neat</u> and <u>label</u> your answers.
    (a) Give the null and alternative hypotheses. [1 point]
    (b) In the story it states that the two population variances are assumed to be equal. Find and circle the estimate of this common variance. [1 point]
    (c) Find and circle the test statistic and the p-value for this test. [1 point]
    (d) Give the decision for the test. Write a conclusion that relates your decision to the context of the problem. [2 points]

<u>Problem 4</u> – A new drug designed to reduce fever (and relieve aches and pains) is being tested for efficacy and side effects. Ten patients entering a hospital with a high fever were selected at random. The temperature (in °F) of each patient was measured, the drug was administered, and two hours later the temperature was measured again. The data is in the file <u>Excel Homework 6 – Problem 4</u>. Assume normality. Conduct the appropriate test of hypotheses to determine whether there is any evidence that the new drug reduces the mean patient temperature after two hours. Use $\alpha = 0.05$.

<u>Create the Output</u> [2 points]
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- Make your header – enter your name and information into cells A1 to A5 (just as you did for the previous Excel homework assignments).
- Use the appropriate Excel function to produce the needed output. Position the output to the right of the data (e.g. cell D7). Also, widen the columns so all the information can be read and make sure the output will fit on one page.

<u>Questions</u> – write your answers to the following directly on your output. Be <u>neat</u> and <u>label</u> your answers.
    (a) Give the null and alternative hypotheses. [1 point]
    (b) Find and circle the test statistic and the p-value for this test. [1 point]
    (c) Give the decision for the test. Write a conclusion that relates your decision to the context of the problem. [2 points]

Note – When printing, if your Excel spreadsheets look as though the content you typed has had extra spaces inserted, then see the comment on Excel Homework 1.