MATH232 Assignment 07

Confidence Intervals and Hypothesis Testing for Two Populations

Guidelines

- Your work must be organized neatly and typed
- Clearly indicate your name and the assignment number in the file name
- Electronic copies of your work can be submitted as an attachment to the drop box
- You need to hand in individual work. You may talk with each other about the problems
- However, everything in the assignment must be your own work. You are not allowed to use classmate's Minitab Express output. Using Minitab Express output that is not your own is a violation of academic integrity
- No late assignments will be accepted

Instructions

The key steps to tests of significance are to state H_0 and H_A, calculate the **test statistic**, compute the ***p-value***, and make a conclusion based on the given significance level. If you input the hypotheses and the summary statistics into Minitab Express, Minitab Express will output the test statistic and *p*-value and you will not have to do any complex calculations. Keep in mind that the results obtained from software are not meaningful unless the correct null and alternative hypotheses are determined.

If the question requires a test of significance, your solution should clearly show the four steps to the test. In addition, you should show that you have checked that the conditions for inference are met.

Step 1: State the null and alternative hypothesis. (Use "mu" or the symbol μ.)
Step 2: Calculate the test statistic.
Step 3: Find the *p*-value.
Step 4: State your conclusion in the context of the problem.
   (Do not just say "Reject H_0" or "Do not reject H_0.")

If the question requires a confidence interval, be sure to make a statement about the confidence interval in context of the problem.

1. (4 points) Professor Handy measured the time in seconds required to catch a falling meter stick for 12 randomly selected students' dominant hand and nondominant hand.   The Minitab Express file contains these measurements. Professor Handy claims that the reaction time in an individual's dominant hand is less than the reaction time in their nondominant hand. Assuming that the differences follow a normal distribution, test the claim at the 5% significance level.

2.   (4 points) **The New England Patriots**. The 2017 roster of the New England Patriots, winners of the 2017 NFL Super Bowl included 12 defensive linemen and 9 offensive linemen. The Minitab Express file for this problem contains the weights in pounds of the offensive and defensive linemen. Use this data set to test the claim that the defensive linesmen weigh less that the offensive linemen at the 5% level of significance.

3. (4 points) **Stress and weight in rats.** In a study of the effects of stress on weight in rats, 71 rats were randomly assigned to either a stressful environment or a control (nonstressful) environment. After 21 days, the change in weight (in grams) was determined for each rat. The table below summarizes the data on weight gain. Test the claim that stress effects weight. (Use a 10% significance level.)

Group	*n*	Sample mean	Sample Standard Dev.
Stress	20	26	13.4
No stress	51	32	14.2

4. (4 points) A study was conducted to investigate the effectiveness of hypnotism in reducing pain. Results for randomly selected subjects are given below. At the 1% level of significance, test the claim that the sensory measurements are lower after hypnotism (scores are in cm. on a pain scale). Assume sensory measurements are normally distributed. Note: You do not need to type these values into Minitab Express; the data file has been created for you.

Before	6.6	6.5	9.0	10.3	11.3	8.1	6.3	11.6
After	6.8	2.4	7.4	8.5	8.1	6.1	3.4	2.0

5. (4 points) Nicotine patches are often used to help smokers quit. Does giving medicine to fight depression help? A randomized double-blind experiment assigned 244 smokers who wanted to stop to receive nicotine patches and another 245 to receive both a patch and the antidepressant drug bupropion. After a year, 40 participants in the nicotine patch group and 87 in the patch-plus-drug group had abstained from smoking.

	Count that Abstained From Smoking	Sample Size
Patch + bupropion	87	245
Patch Only	40	244

Is there a significantly higher proportion of the patients that receive the patch plus bupropion abstaining from smoking than the patch only group? Carry out a test of significance at the 5% significance level.

6. (4 points) A random sample of individuals participating in a survey in 2000 was asked "Do you favor or oppose the death penalty for murder?" The results were 130 out of 200 females favored capital punishment and 188 out of 250 males favored capital punishment. **Find an approximate 95% confidence interval for the difference between the proportion of females and males that favor capital punishment**. Based upon your confidence interval do you believe the proportion of males that favor capital punishment is greater than the proportion of females that favor capital punishment? Justify your answer.