MT 143, Lab #5, Spring 2020 Name _____

Instruction: Complete each of the steps below using Minitab. You can find the data in the file **143data5.xlsx**. You will need to copy and paste the data into Minitab. Complete the tasks below. Copy and paste any output (graphs, tables, summary statistics, etc.) to a Word document where you should include the requested analysis next to each item. Save the Minitab work as a project. Submit the Word document and the Minitab file to Blackboard.

1. Conduct a hypothesis test (of means) on shoe sizes in the US to see if our data on Sheet 1 agrees with the national averages or is different than it. For women, publicly available data says the average shoe size is a 9, for men it's a 10.5. Sort the data by gender and calculate the mean and standard deviation of shoe sizes for each group.
   a. Create graphs of each set of data and come up with an initial guess for whether the data appears to agree or disagree with national data.

   b. State the null and alternative hypotheses for both the tests we are conducting.

   c. For each test, calculate the test statistic in Minitab: find the difference between the sample mean and then divide that result by the standard error (the sample standard deviation divided by the square root of the sample size). Convert the test statistic to a P-value using the T-distribution function. For each test be sure to state i) the test statistic, ii) the p-value, and iii) the conclusion of your test in statistical language.

   d. State your conclusion for each test in context, in a way that a non-statistically trained person can understand.

2. According to an internet search, 48.2% of Americans report that they are married. Use the data on Sheet 2 to conduct a hypothesis of proportions to determine if our data agrees or disagrees with the reported percentage.
   a. Create a pie chart and frequency table of marriage data (1=Married).

   b. Conduct your hypothesis test. State the null and the alternative hypothesis. Find the test statistic and convert to a P-value. Clearly state the conclusion of the test.

   c. If the conclusion of your test is incorrect, what kind of error would that represent?

3. Using the same data on Sheet 2, into Married and Unmarried groups.
   a. Create a comparative boxplot of the data and summarize what the boxplot seems to say about the spending habits of married and unmarried people.

   b. Conduct a two-sample hypothesis test (of means) to determine if the two groups spend the same (or different) amount of money. Clearly state the null and alternative hypotheses, find the test statistic, and convert to a P-value. Clearly state the conclusion of the test.

   c. If the conclusion of your test is incorrect, what kind of error would that represent?

4. Using the data on Sheet 3, conduct a two-sample hypothesis test of means. Separate the data into those that have received a coupon and those that did not. Determine if the proportion of

purchases in the coupon group was larger than the proportion of purchasers in the non-coupon group. Clearly state the null and alternative, hypotheses, the test statistic, the P-value and the conclusion of the test. Create a graph of your choice to visualize your findings.