**Name:**

**Objectives:** Upon completion of this activity, you should…

* Be able to perform all steps of a hypothesis test for a proportion by hand and in JM
* Be able to use the rejection region approach and the p-value approach in a hypothesis test for a proportion.
* Notice the differences in the conditions required for a hypothesis test and a confidence interval in regards to proportions
* Notice the similarity between a two-tail hypothesis test and a confidence interval.

Delectable Delights is a large consumer food manufacturer selling its products in retail stores nationwide. You have landed your first job after graduation from Clemson in their advertising division. Since you took statistics as a part of your coursework, you are often called upon to perform data analysis for the advertising division, as well as other divisions of the company.

**Directions:** Answer the following questions using complete sentences as though you were presenting your analysis to the employees of Delectable Delights. Please provide any appropriate output and/or screenshots from JMP. Instructions for creating several types of graphs or tables and statistics can be found on Canvas in the file **JMP Instructions.docx**. Paste your answers and any output into this document.

The CEO of Delectable Delights, Rebecca Leopold, read an article about a Gallup Poll survey that stated that 46% of US adults had to deal with some type of substance abuse in their families.

<https://news.gallup.com/poll/267416/substance-abuse-hits-home-close-half-americans.aspx>

She is concerned for the wellbeing of her employees and their families. Therefore, she included the following question on an employee wellness poll. “Have you needed to help a family member who has experienced a substance abuse problem?” There were 50 participants for the poll who were randomly selected from the employees at Delectable Delights. You are asked to perform a hypothesis test to see if the proportion of employees who have helped a family member who experienced a substance abuse problem is different than 46% which is the value found by the poll. Use a significance level of .01 (1%). The data is found in the file **Wellness Poll.jmp**.

1. Define the parameter of interest and state the hypotheses for this test. Be sure to include use the appropriate symbol for the parameter. (10 pts)
2. Have the conditions for performing a hypothesis test for a population proportion been met? Explain. (10 pts)
3. Use JMP to calculate the summary statistics for your data using the **Analyze >> Distribution** steps. Paste your results below and answer the following question. (5 pts)
4. What is the value of the sample proportion ? Be careful here that you select the value of based on how p is defined in #1. (5 pts)
5. Calculate the value of the test statistic by hand. Show your work by substituting values into the correct formula. (10 pts)
6. Using the information on page 25 of the JMP Instructions, perform the hypothesis test in JMP and verify your calculation for the test statistic.

Paste the output below. (5 pts)

1. Use the rejection region approach to determine whether or not to reject the null hypothesis. Notice that JMP kindly gave you the critical values. (10 pts)

State the RR:

What is your decision regarding the null hypothesis?

1. Use the p-value approach to determine whether or not to reject the null hypothesis. (5 pts)

P-value =

What is your decision regarding the null hypothesis?

Notice that you will come to the same conclusion as in #7. The two approaches will always have the same results however the values you are comparing when you make your decision are different. In the RR approach you compare the test statistic directly to a critical value that is based on the level of significance. In the P-Value approach you compare the p-value of the test statistic directly to your level of significance. If you did not reach the same conclusion, ask for clarification on these two approaches.

1. Write the summary statement for the hypothesis test. (10 pts)

We will now find a 99% confidence interval for this problem. You do not need to re-define the parameter of interest.

1. Have the conditions for calculating a confidence interval for a proportion been met? Notice that there is a slight difference between the conditions for the hypothesis test and the confidence interval. In the hypothesis test we assume the null hypothesis is true and therefore use the value of to check conditions. In the confidence interval, we can only use the point estimate of when we check conditions. (10 pts)

1. Calculate a 99% confidence interval using JMP. On page 20 of the **JMP Instructions** document are instructions on how to use JMP to calculate the confidence interval for a proportion. The instructions are to calculate a 95% confidence interval, be sure to adjust this to a 99% confidence interval for this problem. Paste the JMP results here. (5 pts)
2. Interpret your confidence interval in the context of the problem. (10 pts)
3. Compare the summary statement of the hypothesis test in #9 to the interpretation of the confidence interval in #12. What do you notice about a two-tail hypothesis test and a confidence interval? (Do they provide the same information in a slightly different format? Explain?) (5 pts)