**Name:**

**Objectives:** The purpose of this activity is to use JMP to calculate confidence intervals for the mean and proportion of a population from sample data. Upon successful completion of this activity, you will be able to…

* Use JMP to calculate a confidence interval for a population mean and a population proportion.
* Construct and interpret a confidence interval for a population mean
* Construct and interpret a confidence interval for a population proportion
* Be able to identify the population and parameter of interest in the context of the problem
* State and verify the conditions necessary to construct a confidence interval for either a population mean and a population proportion
* Be able to interpret the confidence level
* Draw conclusions about the population based on the results of a sample

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.

**Confidence Intervals for a Mean and Proportion (80 pts)**

1. **Noodle Dilemma (40 Points)**

The process that makes the spaghetti noodles for Delectable Delights is supposed to produce noodles with an average length of 252.5 mm. Allison, the Quality Control Manager, is concerned that Machine #42 is not working properly and the noodles it produces are too short. You are asked to take a random sample of 40 noodles from Machine #42 and calculate a 90% confidence interval for the average length of Machine #42’s noodles.

1. Define the parameter of interest, , in the context of the problem. (5 pts)
2. Have the conditions for calculating a confidence interval for a population mean been met? Explain. (10 points)
3. A screenshot of a cell phone

   Description automatically generatedUse JMP to take a random sample of 40 noodles from the noodles produced by Machine #42. You can find the noodles that Machine #42 produced in the file **Noodles from** **Machine 42.jmp.** Open this file and select **Tables >> Subset**. Under the heading **Subset by**, choose **Random – sample size** and enter 40. Click **OK**. JMP will then create a new data table with 40 randomly selected noodle lengths. Save this new data table and use it help you answer the rest of the question.

Use JMP to find the default summary statistics (Analyze>>Distribution) of your random sample and paste the results here. (5 pts)

Use the sample from part (c) to calculate a 90% confidence interval for the mean length of noodles from Machine #42. Follow the directions on pages 17 and 18 of the JMP Instructions to change the default confidence interval from 95% to 90%. Since you have already done step 1 in part (c), you can begin at step 2. Paste the new results from the Summary Statistics Table here. (5 points)

1. Interpret the 90% confidence interval you found in part (d). (10 points)
2. Using the confidence interval that you found, do you believe that Machine #42 is making noodles that are too short? (5 pts) 252.5

1. **Contact Lenses (40 Points)**

Delectable Delights is evaluating the vision benefits it offers to its employees. They wonder if they should add some additional benefits to assist with the purchase of contact lenses. According to the Vision Council of America (VCA), 11% of American adults wear contact lenses. Delectable Delights wonders if the percentage of its employees who wear contact lenses is about the same as the percentage reported by VCA.

Ken Ronald from Human Resources asks you to take a sample of size 150 from the employees at Delectable Delights and calculate a 95% confidence interval for the proportion of employees who wear contact lenses.

1. We will use the JMP applet found by selecting **Help >> Sample Data >> Teaching Scripts >> Interactive Teaching Modules >> Sampling Distribution of Sample Proportion**.

Open the **Sampling Distribution of Sample Proportion** applet. In the **Population Characteristics** section, change the population proportion to 0.11 and the category name to Contacts. Under **Demo Characteristics**, change the sample size to 150 and the number of samples to 1. Then click 'Draw Additional Samples' to draw 1 random samples of size *n* = 150 and to calculate the sample proportion of employees who wear contacts.

Copy and paste the Sample Summary Table from this one sample below.

1. Have the conditions for calculating a confidence interval for a population proportion been met? Explain. Note – if you’re the conditions for calculating a confidence interval have not been met, repeat part (a) and take another sample. (10 points)
2. Use the sample from part (b) to calculate a 95% confidence interval for the proportion of employees who wear contact lenses. Follow the directions on page 20 of the JMP Instructions to find your confidence interval. Copy and paste the JMP output below (5 points)

1. Interpret the 95% confidence interval you found in part (c) for Ken. (10 points)
2. Does your confidence interval contain the proportion 11% that was reported by the VCA? (2 pts)

1. There are approximately 950 students taking STAT 3090. What proportion or percentage of them will calculate a 95% confidence interval in part (d) that does not contain the value 11%? Note: This is an example of the interpretation of the Confidence Level found at the top of page 135 in your lecture guide. (3 pts)