**OPTIONAL Project #6 (Unit 11)**

**Instructions:** For this project, I would like you to pick a numerical variable from the survey results for my last 4 statistics courses and create a question around it that must be answered using either:

* A confidence interval for 

OR

* A hypothesis test that involves 

Based on the data, develop a position (a thesis statement) that addresses the question you created. You must use concepts from Unit 11 to earn points for this project.

If you choose a Hypothesis Test, you are able to earn 2 points of extra credit by investigating the possible errors (type I and type II error).

**Data:** <https://docs.google.com/spreadsheets/d/1eo39Wony34pQERf420qTKMdNBd4MnIuUUkYTHZz2-BI/edit?usp=sharing>

**Think It Through:**

1) Pick a numerical variable and think of a good question. Remember that confidence intervals are used to *estimate* a parameter, while hypothesis tests are used to test if a claim is true. If you are thinking of making a claim about the population, use a hypothesis test. If you want to see how “large” a value is, use a confidence interval.

**If you create a Hypothesis Test Problem:**

1) Clearly identify the Hypotheses. State them in both words **and** with symbols.

2) Check the criteria. I still want you to continue to try to answer this question, even if the sample doesn’t meet the requirements! But, I want you to state whether it does or not, with an explanation of *why*.

3) Describe the distribution of sample means, assuming that the criteria *are* satisfied (even if they aren’t). Use technology to help find relevant statistics.

4) Calculate the p-value and describe what it means, in words, using the context of the question.

5) Draw a conclusion that addresses the question you created.

**If you create a Confidence Interval Problem:**

1. Use technology to calculate the relevant statistics needed.
2. Make sure that our sample satisfies the appropriate criteria! I still want you to complete the project, even if it doesn’t, but I want you to address whether it does or not!
3. Calculate a confidence interval to answer the question you created.
4. Draw a conclusion that addresses the question.

Write 1 paragraph for the question posed, using your observations to support your conclusions.

*Tip: If you are having trouble writing a paragraph, start with a sentence that gives your thesis. Then write 1-2 sentences for each of the pieces listed above. Try to add transitions that help tie your observations back to your thesis. Use the rubric below as a checklist to guide you.*

**Project #6 Rubric (Hypothesis Testing)**

Total points

|  |  |
| --- | --- |
|  | Points |
| **Create a Question:** Create a Question that must be solved using a Hypothesis Test. Make the question clear to your reader. (2 point) |  |
| **Describe the sample and the population:** In your paragraph, describe the population, the sample and the sample proportion. (2 points) |  |
| **Clearly State the Hypotheses:** You need to express the null and alternative hypotheses in both symbols and words. (4 points) |  |
| **Check that Criteria are met:** Is the sample size large enough? Is the sample good enough? Even if it’s not, I want you to continue to solve this problem, but it should be stated whether the criteria are met or not. (2 point) |  |
| **Describe the Distribution of Sample Means:** In your paragraph, describe the mean and standard error of the distribution of sample proportions (***if*** the null hypothesis were true) (2 points) |  |
| **Calculate the p-value:** Test the claim at the 5% significance level. Use technology to calculate the p-value and describe what it means in words. (4 points) |  |
| **Conclusion of Hypothesis Test:** Write out the conclusion you will draw from running your hypothesis test (accept or reject the null hypothesis), based on the p-value. (1 point) |  |
| **Thesis statement:** Clear position that addresses the research question. (1 point) |  |
| **Overall logic and coherence:** Observations connect to the thesis in a logical way. Explanations tell us why observations are important or interesting.(1 point) |  |
| **BONUS:** If your problem is very sophisticated, I would grant you bonus points.  |  |
| **BONUS**: Write out what a Type I and a Type II Error would be. Make it clear and easy to understand. (2 points) |  |

**Project #6 Rubric (Confidence Interval)**

Total points

|  |  |
| --- | --- |
|  | Points |
| **Create a Question:** Create a Question that must be solved using a Confidence Interval. Make the question clear to your reader. (1 point) |  |
| **Describe the sample and the population:** In your paragraph, describe the population, the sample and the sample proportion. (1 points) |  |
| **Check that Criteria are met:** Is the sample size large enough? Is it a good sample? Even if it’s not, I want you to continue to solve this problem, but it should be stated whether the criteria are met or not. (1 point) |  |
| **Calculate the Margin of Error:** Using a confidence level of 95%, calculate and describe what the Margin of Error means in words for each confidence interval. Show your work for full (and partial!) credit. (2 points) |  |
| **Calculate the Confidence Interval:** Create a confidence interval to answer the question you created. You must write out what it means, in words for full credit. (2 points) |  |
| **Thesis statement:** clear position that addresses the research question. (1 point) |  |
| **Overall logic and coherence:** Observations connect to the thesis in a logical way. Explanations tell us why observations are important or interesting.(1 point) |  |
| **BONUS**: If you create a very sophisticated question that requires more work than just calculating a confidence interval, you may earn extra bonus points. This could include the comparison of 2 or more groups. If there is such work shown, I will give you more points. |  |