

Math 140 Poster Project Instructions and Grading Rubric **2 Pop Mean or Proportion Hypothesis Test and Confidence Interval**

***Overall Description** : You will be collecting either quantitative data from two groups or categorical data from two groups. Your goal will be to compare the two groups. If your data is quantitative, you will be comparing the sample means. If your data is categorical, you will be comparing the sample percentages. Which group has a greater sample mean or sample percentage? We will be using confidence intervals and hypothesis tests to determine if the larger group is significantly higher than the smaller group and if the sample data will apply to the population. You must discuss how you collected your data and if it meets the assumptions for a 2 pop mean or 2 pop proportion hypothesis tests and confidence intervals. If your data does not meet assumptions, still do the test and confidence intervals and make your poster. If your data does not meet assumptions, you will need to say that your data does not apply to the population. Perform the hypothesis test that the larger group is significantly higher than the smaller group. You will need to give the null and alternative hypothesis, the test statistic for 2 mean or 2 proportion, the P-value, whether or not you rejected the null hypothesis and the conclusion. We will also create a 95% confidence interval for the difference of means or difference of proportions. You should write a sentence or two that explains the confidence interval to your audience. Make sure to include whether or not the larger group is significantly larger than the smaller group or not, and how much greater could the larger group (population) be than the smaller group (population). Be sure to decorate your poster and explain why this topic was important or interesting to you.*

Grading Rubric for 2 population Proportions (100 points total) (For Categorical Data)

Collect categorical data from two groups. Your goal will be to compare the percentages (proportions) from the two groups. You do not need to put the actual categorical data on your poster.

1. Discuss how you collected your data. **(5 points)**
2. Give the sample percentage for each group. Which group has a greater sample percentage? **(5 points)**
3. Give the total sample sizes and the number of successes for each group. **(5 points)**
4. Does your data meet the assumptions for a 2 pop proportion hypothesis tests and confidence interval? (*Random, At least 10 successes, At least 10 failures, Independent groups*) **(5 points)**
5. Will the sample data apply to the population or not? (*Remember if your data does not meet assumptions, still do the test and confidence intervals and make your poster. If your data does not meet assumptions, you will need to say that your data does not apply to the population.*) **(5 points)**

Note: We will be using a 2 population proportion hypothesis test to determine if the larger group percentage (P_1) is significantly higher than the smaller group percentage (P_2). Make the data with the larger sample percentage be “population 1” and the data with the smaller sample percentage be “population 2”.

6. Give the null and alternative hypothesis. Which is the claim? Is this a right tail, left tail or two tail test? **(5 points)**
7. Give the test statistic for 2 proportion. **(5 points)**
8. Write the traditional sentence to explain the meaning of the test statistic. **(5 points)**
9. Is the larger sample percentage significantly greater than the smaller sample percentage? *(Use the test statistic to determine this.)* **(5 points)**
10. Give the P-value. **(5 points)**
11. Write the traditional sentence to explain the P-value. **(5 points)**
12. Could the two populations have the same population percentage and the sample difference just happened because of sampling variability (random chance) or does the P-value indicate that this probably did not happen by random chance and the population percentages are probably different? *(Use the P-value to answer this.)* **(5 points)**
13. Based on a 5% significance level, should you reject or fail to reject the null hypothesis? Be able to explain why. **(5 points)**
14. Write the traditional conclusion sentence for the hypothesis test. **(5 points)**
15. Create one 90% or 95% confidence interval for the difference of proportions (percentages). *(Make the data with the larger sample percentage be “population 1” and the data with the smaller sample percentage be “population 2”. 90% is correct. We are using a 1 tail hypothesis test with a 5% significance level. Since the confidence interval has 2 tails, we want to keep the 5% in each tail. This gives a 90% confidence. If you are doing a two tailed hypothesis test, use 95% confidence.)* **(5 points)**
16. Write the traditional sentence that explains the confidence interval. **(5 points)**
17. Is the percentage of the first group significantly larger than the second group? If there is a significant difference, then also answer the following: How much greater could the percentage of population 1 be than the percentage of population 2? *(Use the confidence interval to answer these two questions.)* **(5 points)**

18. Explain why this topic was important or interesting to you. **(5 points)**
19. Decorate your poster. **(5 points)**
20. Present your poster to the class. **(5 points)**

Grading Rubric for 2 population Means (100 points total) (For Quantitative Data)

Collect quantitative data from two groups. Your goal will be to compare the mean averages from the two groups. You do not need to put the actual quantitative data on your poster.

1. Discuss how you collected your data. **(5 points)**
2. Give the sample mean for each group. Which group has a greater sample mean?
(5 points)
3. Create Histograms of each data set to check shape. **(5 points)**
4. Does your data meet the assumptions for a 2 population mean hypothesis tests and confidence interval? (*Random, Independent groups or matched pairs, each sample size is at least 30 or bell shaped – discuss both the size and shape of each data set*) **(5 points)**
5. Will the sample data apply to the population or not? (*Remember if your data does not meet assumptions, still do the test and confidence intervals and make your poster. If your data does not meet assumptions, you will need to say that your data does not apply to the population.*)
(5 points)

Note: We will be using a 2 population mean hypothesis test with the T-distribution to determine if the larger group mean (μ_1) is significantly higher than the smaller group mean (μ_2). Make the data with the larger sample mean be “population 1” and the data with the smaller sample mean be “population 2”.

6. Give the null and alternative hypothesis. Which is the claim? Is this a right tail, left tail or two tail test? **(5 points)**
7. Give the T-test statistic for difference of means. **(5 points)**
8. Write the traditional sentence to explain the meaning of the T-test statistic. **(5 points)**
9. Is the larger sample mean significantly greater than the smaller sample mean? Explain why. (*Use the test statistic to determine this.*) **(5 points)**

10. Give the P-value. **(5 points)**
11. Write the traditional sentence to explain the P-value. **(5 points)**
12. Could the two populations have the same population mean and the sample difference just happened because of sampling variability (random chance) or does the P-value indicate that this probably did not happen by random chance and the population means are probably different? *(Use the P-value to answer this.)* **(5 points)**
13. Based on a 5% significance level, should you reject or fail to reject the null hypothesis? Be able to explain why. **(5 points)**
14. Write the traditional conclusion sentence for the hypothesis test. **(5 points)**
15. Create one 90% confidence interval for the difference of means. **(5 points)**

Note: Make the data with the larger sample percentage be “population 1” and the data with the smaller sample percentage be “population 2”. 90% is correct. We are using a 1 tail hypothesis test with a 5% significance level. Since the confidence interval has 2 tails, we want to keep the 5% in each tail. This gives a 90% confidence. If you are doing a two tailed hypothesis test, use 95% confidence.)

16. Write the traditional sentence that explains the confidence interval. **(5 points)**
17. Is the mean average of the first group significantly larger than the second group? If there is a significant difference, then also answer the following: How much greater could the mean average of population 1 be than population 2? *(Use the confidence interval to answer these two questions.)* **(5 points)**
18. Explain why this topic was important or interesting to you. **(5 points)**
19. Decorate your poster. **(5 points)**
20. Present your poster to the class. **(5 points)**