

Math 227 Project 3 Inferences on Two Population Parameters

In this project, you will draw inferences on comparing two population parameters: proportions, means, or standard deviations (or variances). You will describe a problem including a general claim made about comparing two population parameters, collect data, test hypotheses, and construct and interpret a confidence interval to determine whether the claim made about two population parameters can still be supported by the samples collected. You will, then, write a report on your findings including all the required components below and turn in by the stated due date according to the guidelines provided in this paper.

Required components:

1. Understand the Problem

a) Select a parameter of your choice: proportion, mean, or standard deviation, for which a general claim can be (or has been) made. Please try to decide on something that you are interested in knowing about. Who (what) are the two populations you want to compare?

b) Describe the problem including a general claim made about two specific populations:

c) Identify any relevant variables to the above problem:

Are these variables categorical or numerical?

d) Collect either categorical or numerical data from two relevant samples. You must collect at least 30 data values from each sample. Discuss how your data has been collected and whether you were able to collect a random sample of data. If a random sampling was not possible, please explain why not.

2. Analyze the Data

a) What parameter is being compared? _____

b) What is the response variable in the problem?

c) Is sampling dependent or independent?

d) Provide appropriate numerical measures and graphical displays in answering the problem.

e) Discuss whether required conditions are met to test hypotheses depending on the parameter being addressed.

	Two Population Proportions-Independent (Section 11.1)	Two Population means from Matched-Pairs-Dependent (Section 11.2)	Two Population means-Independent (Section 11.3)	Two Population standard deviation (or variance) (Section 11.4)
Required Conditions for hypotheses testing and construction a confidence interval	$n\hat{p}(1 - \hat{p}) \geq 10$ for each sample and the sample size is no more than 5% of population size &	Each sample size is greater than 30 or the differences come from a population that	Each sample size is greater than 30 or each population is normally distributed	The data are normally distributed.

	normal distribution	is normally distributed normally distributed with no outliers		
Distributions (Test Statistic)	z-distribution	Student's t-distribution with n-1 degree of freedom	Student's t-distribution	F-Distribution

f) Test hypotheses using $\alpha = 0.05$

- Determine the null and alternative hypotheses. Use proper symbols.
- Use technology to find the test statistics.
- Use technology to find the P-value. Provide the meaning of the P-value about your problem. Also, provide a list of steps in finding the P-value using StatCrunch.
- Make the decision on whether to reject the null hypothesis or not.
Provide a statement about the significance of the sample difference and determine whether the claim made about two population parameters can still be supported by the samples collected. Do you think the population have the same parameters and the difference of sample statistics just happened due to sampling variability (random chance) or do you think the sample difference is indeed significant and it suggests that the population parameters are more likely different? Explain according to the P-value.
- State the conclusion about the claim.

g) Construct and interpret a 95% confidence interval for the difference between two population parameters

- State the confidence interval. Also, provide a list of steps in constructing the confidence interval using StatCrunch.
- Interpret the confidence interval about your problem.
- Does the confidence interval support the conclusion of the hypothesis testing?

3. Draw Conclusions

a) What do the results you got indicate about the inference on comparing two population parameters? Decide whether the claim made about two population parameters can still be supported by the samples collected. Explain using the results of the hypothesis testing and the confidence interval.

b) If it is relevant or meaningful in context, think of a way that these results could be used in practice.

4. Summarize

Write a short summary of the main findings that you discovered.

Grades will be based on:

1. Explanation of your topic and appropriate responses in part 1 Understanding the problem [10 pts],
2. Relevance and completeness of the analysis of the data including appropriate responses in part 2 Analyze the paired Data [50 pts],
3. Completeness and appropriateness of drawing conclusions in part 3 Draw conclusions [20 pts],
4. Clear summary of the main findings in part 4 Summarize [10 pts], and
5. Overall quality of the report and adherence of the project guidelines [10 pts]

Submission Guidelines and the due date:

The report including all graphs and characters must be generated using computer and only the printed version will be accepted. The report should contain the title, your name, date, course name and instructor's name. The report should not contain any misspelled words. The report will not be returned to you.

The project score sheet along with the title of your project and the website where you collected or found your data (page 4 of this guidelines), must be submitted to the instructor by: _____

The project is due at the beginning of the lab on: _____

Note: Late submission will be accepted. However, there will be 10% per day penalty from your final project grade.

Math 227 Project 3 Inferences on Two Population Parameters-Score Sheet (Total 100 points)

Name: _____ Date: _____

Title of the project: _____

Website where you found the data: _____

Project Grade: _____

Required Tasks	Grading criteria	Comments/Scores
1. Understand the Problem a) Select a parameter of your choice: proportion, mean, or standard deviation, for which a general claim can be (or has been) made. Please try to decide on something that you are interested in knowing about. Who (what) are the two populations you want to compare? b) <u>Describe the problem including a general claim made about two specific populations:</u> c) <u>Identify any relevant variables to the above problem:</u> Are these variables categorical or numerical? d) Collect either categorical or numerical data from two relevant samples. You must collect at least 30 data values from each sample. Discuss how your data has been collected and whether you were able to collect a random sample of data. If a random sampling was not possible, please explain why not.	1. Explanation of your topic and appropriate responses in step 1 Understanding the problem [10 pts]	
2. Analyze the paired Data a) What parameter is being compared? _____ b) What is the response variable in the problem? c) Is sampling dependent or independent? d) Provide appropriate numerical measures and graphical displays in answering the problem. e) Discuss whether required conditions are met to test hypotheses depending on the parameter being addressed. f) Test hypotheses using $\alpha = 0.05$ - Determine the null and alternative hypotheses. Use proper symbols. - Use technology to find the test statistics - Use technology to find the P-value. Provide the meaning of the P-value about your problem. Also, provide a list of steps in finding the P-value using StatCrunch. - Make the decision on whether to reject the null hypothesis or not. Provide a statement about the significance of the sample difference and determine whether the claim made about two population parameters can still be supported by the samples collected. Do you think the population have the same parameters and the	2. Relevance and completeness of the analysis of the data including appropriate responses in step 2 Analyze the paired Data [50 pts]	

difference of sample statistics just happened due to sampling variability (random chance) or do you think the sample difference is indeed significant and it suggests that the population parameters are more likely be different? Explain according to the P-value. - State the conclusion about the claim. g) Construct and interpret a 95% confidence interval for the difference between two population parameters - State the confidence interval. Also, provide a list of steps in constructing the confidence interval using StatCrunch. - Interpret the confidence interval about your problem. - Does the confidence interval support the conclusion of the hypothesis testing?		
3. Draw Conclusions a) What do the results you got indicate about the inference on comparing two population parameters? Decide whether the claim made about two population parameters can still be supported by the samples collected. Explain using the results of the hypothesis testing and the confidence interval. b) If it is relevant or meaningful in context, think of a way that these results could be used in practice.	3. Completeness and appropriateness of drawing conclusions in step 3 Draw conclusions [20 pts]	
4. Summarize Write a short summary of the main findings that you discovered.	4. Clear summary of the main findings in step 4 Summarize [10 pts]	
5. Overall quality of the report	5. Overall quality of the report and adherence of the project guidelines [10 pts]	