MATH108: Elementary Stats

Fall 2023

Mini-Project 01

Work with 3-4 classmates (groups of 4-5) and submit as a group on PLATO.

Your project is due by 11:59pm on Thursday, October 19th.

Learning Objectives:

A. Design, conduct, and analyze an experiment

Overview:

For this project, you will run a (small) experiment to learn something about your university peers at Westfield State. Everything you are expected to do for this experiment is laid out below. As you design, conduct, and analyze you experiment, record what you do either neatly handwritten or in a word document. That record will be the report you hand in at the completion of the project.

For this assignment, you will self-assess. That means you will look at the rubric for the assignment (below) and assess your work in each area laid out in it. Your self-assessment will factor into your grade but may be adjusted.

Part 1 – Experimental Set up

A. Research Question

Talk to your groupmates and decide on a research question. Remember, the
purpose of your experiment is to find something out about the population of
students at WSU using the class as a study sample. The question you're curious
about can be anything of interest to you as a group but must be something you can
answer with an experiment.

B. Experimental Design

 Based on your research question, diagram out your study. What data will you collect from participants? What are the response and explanatory variable(s)? You should be able to fill in a chart like this (your chart might be slightly different, depending on your question):

		<response variable=""></response>	
		<;>	<;>
<explanatory variable=""></explanatory>	<;>		
	<;>		

B. Collect Data

• Collect data from everyone who is in class today. Record the results of your data collection in a data table in google sheets (or excel).

C. Data Retrospective

- Think about your sample vs your population of interest. Do you think your sample is biased? If so, how? If you were to run this experiment again, what sampling method would you use?
- Take a screenshot of the first 10 rows of your data table. Label the observations and variables. For each variable, identify whether it is numeric or categorical. If it is numeric, is it continuous or discrete? If it is categorical, is it nominal or ordinal and what are the levels?

Part 2 – Data Summary

A. Hand Calculations

- Using *only the first 5 rows* of your data table, calculate the following by hand. Record your calculations, showing all your work.
 - i. If your response variable is binary
 - Sample proportion (\hat{p})
 - Standard deviation (σ)
 - ii. If your response variable is continuous
 - Sample mean (\bar{x})
 - Standard deviation (σ)

B. Spreadsheet Calculations and Visualizations

- Using all your data and google sheets or excel (formulas in brackets below), calculate the following:
 - i. If your response variable is binary
 - Sample proportion (\hat{p}) [=COUNTIF(range, criteria)/COUNTA(range)]
 - Standard deviation (σ) [=STDEV(range)]
 - ii. If your response variable is continuous
 - Sample mean (\bar{x}) [=AVERAGE(range)]
 - Standard deviation (σ) [=STDEV(range)]
- Using all your data and google sheets or excel, create an appropriate visualization to show the spread of your data. Describe what your visualization shows.

Part 3 – Analysis and Output

A. Confidence Interval

- Calculate a 95% confidence interval to capture the true population value based on your sample statistic. Do this calculation by hand and show all your work.
- Once you have your confidence interval, write a sentence that explains what (if anything) it says about WSU students.

B. Hypothesis Test

- Perform the same data collection within your group as you did for the entire class. Calculate the sample statistic for your group and use hypothesis testing to see if your group differs significantly from the statistic you got for WSU.
- Remember to record your null and alternative hypotheses, and to show all your work.
- At the end of your test, explain whether you reject or fail to reject the null hypothesis, why, and what that means with respect to your experiment.

Submission

Save your report as a PDF. Copy the self-grading rubric below to the end of your report and fill it out. For each standard listed on the left of the rubric, do an honest assessment of your work compared to the standard. Mark which category your work falls into (approaching, meets, exceeds), and indicate where in your report you demonstrate meeting the standard at that level.

Submit your work as a group through PLATO.

Rubric			
	Approaching	Meets	Exceeds
Research Question			
Research question is well formed,			
includes a population of interest,			
and variables of interest.			
Experimental Design			
Response and explanatory			
variables identified.			
Collect Data			
Data table set up appropriately			
with columns and rows.			
Data Retrospective			
Bias (if any) of sampling method			
clearly explained. Future			
sampling technique identified			
and justified.			
Data table observations and			
variables labeled appropriately.			
Variable types identified.			
Hand Calculations			
Appropriate calculations			
performed given data.			
Calculations done correctly and			
legibly.			
Spreadsheet Calculations and Visua	alization		
Appropriate visualization chosen			
given the data.			
Confidence interval			
calculated with stops shown			
Pool world mooning of			
confidence interval clearly			
stated			
Hynothesis Test			
Correct hypothesis test			
calculations performed, with			
steps shown.			
Implications of hypothesis test			
clearly explained.			
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