MATH108: Elementary Stats

Fall 2023

Mini-Project 03

Your project is due by 11:59pm on Thursday, December 07th.

This is a group assignment. Work in groups of 3-4.

Learning Objectives:

• Perform experiments requiring categorical inference

Overview:

For this project, you will do two experiments, each a spin on Labby's dice experiment. The biggest difference will be that instead of using standard 6-sided dice you will use 10-sided dice. Additional details are below.

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.

Experiment 1 – Distribution of Rolls

The goal of this experiment is to answer the research question:

Are the 10-sided dice fair?

Follow these steps, recording your answers to any questions and clearly showing your work. You can hand write or type your report, but it must be legible, well formatted, and easily readable to someone who is not familiar with this assignment.

- 1. Collect data
 - a. Work with your group to roll the dice you were given and record the results.
 Each die should be rolled 20 times, and each time you should record what face it landed on. (Using an excel or google sheet is *highly* recommended.)
- 2. Visualize outcomes

- a. Build an appropriate visualization to show the distribution of outcomes from your experiment.
- 3. Run a hypothesis test
 - a. Run a hypothesis test to answer the research question above. Be sure to include:
 - i. Hypotheses
 - ii. Contingency table of observed and expected counts
 - 1. Work showing the calculation of expected counts
 - iii. Your test statistic
 - 1. Work showing the calculation of the test statistic
 - iv. Your p-value
 - v. The conclusion of your test with respect to hypotheses and the overall research question

Experiment 2 – Does handed-ness matter?

The goal of this experiment is to answer the research question:

Are which hand a die was rolled with and the face it lands on related?

Follow these steps, recording your answers to any questions and clearly showing your work. You can hand write or type your report, but it must be legible, well formatted, and easily readable to someone who is not familiar with this assignment.

- 1. Collect data
 - a. Work with your group to roll the dice you were given and record the results. Half your group should roll with their left hand only and half should roll with their right hand only. Each die should be rolled 20 times, and each time you should record which hand it was rolled with and what face it landed on. (Using an excel or google sheet is *highly* recommended.)
- 2. Visualize outcomes
 - a. Build an appropriate visualization to show the distribution of outcomes from your experiment.
- 3. Run a hypothesis test
 - a. Run a hypothesis test to answer the research question above. Be sure to include:
 - i. Hypotheses
 - ii. Contingency table of observed and expected counts
 - 1. Work showing the calculation of expected counts

- iii. Your test statistic
 - 1. Work showing the calculation of the test statistic
- iv. Your p-value
- v. The conclusion of your test with respect to hypotheses and the overall research question

Submission

Save your presentation as a PDF. Copy the self-grading rubric below 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 PDF, completed rubric, and ALL team member's participation work as a group through PLATO. Be sure to label each participation work with the author. Individual grades may be adjusted based on presentations and participation.

Rubric

	Approaching	Meets	Exceeds
Experiment 1			
Appropriate visualization			
Accurate hypotheses			
Accurate contingency table of			
observed counts			
Accurate contingency table of			
expected counts			
Accurate calculation of expected			
counts			
Correct test statistic			
Accurate calculation of test			
statistic			
Accurate p-value			
Result of test with respect to			
hypotheses given and accurate			
Result of test with respect to			
research question given and			
accurate			
Experiment 2			
Appropriate visualization			
Accurate hypotheses			
Accurate contingency table of			
observed counts			
Accurate contingency table of			
expected counts			
Accurate calculation of expected			
counts			
Correct test statistic			
Accurate calculation of test			
statistic			
Accurate p-value			
Result of test with respect to			
hypotheses given and accurate			
Result of test with respect to			
research question given and			
accurate			