

Assignment 1

YOUR NAME HERE

due 06/01/22

Assignment 1

This is due prior to the beginning of live session on the due date. Please submit two files to the LMS: 1. a knit file (I prefer pdf, but will accept html - just choose one) and 2. your .Rmd code file. Round all reported statistics to the nearest hundredths place (i.e., two decimal places) when writing up conclusions/interpretations (no need to round them in code). Make sure you answer *all* parts of each question. Also, be sure to review the final knit document - if there are typos/formatting issues, please correct those before uploading.

Please identify students with whom you worked on this assignment here (max of FOUR to a group):

1. [Week 1] Researchers at the University of Utah use a driving simulator in experiments on the effects of divided attention. In one of their experiments, participants were randomly assigned to one of two conditions. One condition was called the single-task condition, and participants' task was to follow a course in the driving simulator. The other condition was called the dual-task condition, and participants' had to follow the course in the driving simulator while at the same time engaged in a hands-free cell phone conversation. The driving simulator recorded each participant's reaction time (in milliseconds) to an obstacle that appeared unexpectedly. The average reaction time was significantly greater in the dual-task condition. Therefore, divided attention had a detrimental effect on driving performance.

a. Identify the independent variable in the study. Is this variable continuous or discrete?

b. Identify the dependent variable in the study. Is this variable continuous or discrete?

2. [Week 1] A math teacher asked 18 of her students to rate how much they like math on a 1 - 7 Likert-scale (1 = not at all, 7 = very much). She received the following responses: 3, 7, 5, 3, 5, 6, 3, 2, 6, 4, 4, 3, 4, 2, 3, 6, 4, 7.

a. Enter the data into R as a vector with a name (of your choosing) and create a histogram.

b. Describe the shape of the distribution using terminology learned in class.

3. [Week 2] Consider the following frequency distribution:

Score	Frequency
7	18
6	77
5	20
4	7
3	3
2	1
1	3

- a. What is the sample size?
 - b. What percent of participants had a score of 4?
 - c. What is the percentile rank for a score of 5?
 - d. What score corresponds to the 80th percentile?
4. [Week 2] Consider two variables from the undergrad student survey (Survey.xlsx): high school GPA (HSGPA) and college GPA (CollegeGPA). Both are on a 5 point scale.
- a. Using software, calculate and report the mean, median, and standard deviation for each variable.
 - b. Interpret the meaning of the mean, median, and standard deviation of the high school GPA variable in the *context of this problem*. Do not provide general definitions here, but interpret what each statistic means for these data.
 - c. Interpret the meaning of the mean, median, and standard deviation of the college GPA variable in the *context of this problem*. Do not provide general definitions here, but interpret what each statistic means for these data.
 - d. Based on the descriptive statistics interpreted in parts (c) and (d), write a sentence or two about the difference between college and high school GPA for this sample.
4. [Week 3] Each participant in an experiment was given one of three tasks. Let these three tasks be symbolized by A_1, A_2, and A_3. The number of errors each participant made in performing the task was recorded by use of the categories “0 errors,” “1 error,” and “2 or more errors.” Thus, every participant was classified in two ways, by task and by number of errors. The following table shows the probabilities for these joint events for any participant drawn at random.

Errors	A_1	A_2	A_3	Total
0	.05	.02	.10	.17
1	.08	.17	.13	.38
2 or more	.20	.15	.10	.45
Total	.33	.34	.33	

Use these probabilities to find

- a. The marginal probabilities of the task events A_1, A_2 , and A_3
- b. The marginal probabilities for numbers of errors
- c. The conditional probability for zero errors given task A_1
- d. The conditional probability for two or more errors given task A_2
- e. The conditional probability of task A_3 given no errors

6. [Week 3] Assume a normally distributed population of resting heart rates with $\mu = 76$ and $\sigma = 5$.

- a. Compute the z-score for a heart rate of 73.
- b. What is the probability of randomly selecting someone whose heart rate is below 73?
- c. What is the probability of randomly selecting someone whose heart rate above 79?
- d. What is the probability of randomly selecting someone whose heart rate either below 60 or above 90?