

MATH205, Fall 2021
Midterm (Simulations), Section 050L
Monday, Oct 25, 2:30 pm

Instructions

Your solution needs to be submitted on Canvas (Assignment “Midterm - Simulations”), including:

- An R script of the work
- Screenshots of the results and the figures

Problem 1 (20pts)

Let X be a discrete random variable with the following probability mass function table

x	1	2	3	4	5
$p(x)$	0.12	0.25	0.08	0.24	0.31

- Simulate a dataset of $n = 5000$ random draws from the distribution.
- Compute the mean, the median and the standard deviation of the dataset
- Produce a bar plot of the dataset.

Problem 2 (20pts)

Load the built-in dataset *mtcars* (Motor Trend Car Road Tests). The data was extracted from the 1974 Motor Trend US magazine, and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles (1973–74 models).

- Produce a stacked bar plot to visualize the relationship between transmission (*am*) and cylinders (*cyl*)
- Make a scatterplot of cylinders (*cyl*) vs. miles per gallon (*mpg*).

The plots should have clear titles and all axes labeled.