HW5

2024-09-29

# Homework 5

Due October 15

## Q1

Q:

Use the state.x77 data matrix and the tapply(), and separately, the aggregate() function to obtain

The mean per capita income of the states in each of the four regions defined by the factor state.region,

Themaximumilliteracy rates for states in each of the nine divisions defined by the factor state.division,

The number of states in each region,

The names of the states in each division,

The median high school graduation rates for groups of states defined by combinations of the factors state.region and state.size.

A:

## Q2

Q:

For a sample , the MAD estimator of scale is defined as were median

Use the matrix object mtcars to compute the MAD estimator of scale for the columns in mtcars

Using the apply() function with the mad() function

By calculating it directly from the definition (i.e., not using the mad() function). You may use the apply() and the sweep() functions but avoid using any loops

A:

## Q3

Q:

Let Answer the following questiuons

Write code to do the above in a for loop.

Rewrite the code that you wrote to use a while loop.

For each of the evaluate the performance for in terms of time taken by the software. To do so, wrap the code around the R function system.time() with the same code as above inside the parentheses. Report the values returned in the output as per the user time field.

Compare the above with results obtained avoiding loops.

A:

## Q4

Q:

A:

## Q5

Q:

The game of craps is played as follows: first, Player 1 rolls two six-sided die; let x be the sum of the die on the first roll. If x = 7 or x = 11, then Player 1 wins, otherwise the player continues rolling until (s)he gets x again, in which case also Player 1 wins, or until (s)he gets 7 or 11, in which case (s)he loses. Write R code to simulate the game of craps. You can simulate the roll of a fair die using the sample() function in R.

A:

## Q6

Q:

Suppose that has polar coordinates given by . Write code to plot the curve for

A:

## Q7

Q:

Consider the following code:

x <- matrix(rnorm(n = 500), ncol = 5)  
varx <- var(x)

Starting with varx, use two applications of the sweep() function, one dividing each row of the matrix and the other dividing each column, of a covariance matrix to obtain R, the correlation matrix.

A: