Assignment 1

Due: Sep 28th, 2020

For those of you who are coding first time, there is a document "Google's R Style Guide" in Canvas, you can read and apply it to your code. It makes your code looks better but this is not mandatory.

Question 1: (50 points)

- Generate a vector x from 5 to 35 with increment 2, and calculate its length.
- Use the x above to generate a 4-by-4 matrix A which filled by rows.
- Calculate the eigenvalues of the matrix A.
- Change the 4 elements of A in first two rows and first two columns to 7. i.e. Let $(A)_{11}, (A)_{12}, (A)_{21}, (A)_{22}$ equal to 7.
- Calculate the determinant of A.
- Calculate the inverse of A.
- Create a vector b by assigning the first row of A to b.
- Find y by solving linear equation $Ay = b$.
- Find a function to calculate the minimum of each element in y and $\frac{\pi}{2}$ as a vector. i.e. $[\min\{y_1, \pi/2\}, \min\{y_2, \pi/2\}, \ldots, \min\{y_n, \pi/2\}]$ (Hints in page 13)
- Read the documentation for function 'diag' and use the function to generate the following 10-by-10 square matrix

$$\begin{bmatrix} 1 & 0 & \cdots & 0 \\ 0 & 2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & 10 \end{bmatrix}$$

Question 2: (10 points)

Calculate the 3rd term and the 50th term of Fibonacci sequence, i.e. S_3 and S_{50}, where $S_n = S_{n-1} + S_{n-2}$ and $S_0 = 0, S_1 = 1$.

Question 3: (10 points)

Print all the numbers between 1 and 100 which are divisible by both 3 and 5.

Question 4: (10 points)

Create a function of n which returns a vector, and the vector contains all numbers between 1 and n which are divisible by both 3 and 5. Call the function with $n = 100$ and $n = 200$.

Question 5: (10 points)

Create a function of a and b to find the smallest positive number that is divisible by a and b. Call the function with $a = 3, b = 5$ and $a = 6, b = 10$.

Question 6: (10 points)

Download JPM.csv from canvas and read this table in R using command. Create a sub-table which only contains Open, High, Low and Close. Using "sapply" function to calculate the mean value of the sub-table for each column.