Forecasting and Decision Making Final Exam

26 April 2023

You have 120 minutes to solve ALL exercises. You are allowed to use your notes and previous code, but communication is not allowed.
In case of exactly the same solutions, exactly the same errors in different exam copies, you risk a disciplinary committee meeting next to the grade of 0.

Question 1
Create a vector FIB of the first 100 elements of a Fibonacci series. The elements are 1, 1, 2, 3, 5, 8, 13, 21… (the nth element is the sum of the (n-1)th and the (n-2)th element. Explain why it cannot be a vector of integer.

Question 2
Provide the code that creates a 10 by 10 matrix using FIB, the first row starting with 1, 1, 2, 3, … Call this matrix FIBMAT.

Question 3
Write a for loop that replaces the elements of the main diagonal (where row and column number is the same) of FIBMAT with its square. Be sure that the loop works with any size of squared matrix.

Question 4
Make a red histogram of the elements of FIBMAT, based on data in Question 3. Make a short comment on the distribution.

Question 5
Test whether the mean of the first and the second column of the FIBMAT matrix is different. Conclude.

Question 6
Import data.xlsx, pay attention that you need only one line of data header. Called the created data frame as Price, use column names Year, Period, Label, A. This data includes the Price Index in the US.
Show the first six rows of the database on Console.

Question 7
Create a 240-element vector called T that takes the values 1, 2, 3, … 240. Add it to the beginning (first column) of data frame Price.
Plot the line 176.8+0.355*T together with A.

Question 8
Build a moving average model to A. Use 7 lags. Call your forecast variable AM.

Question 9
Build an AR(2) aka ARMA(2,0) model to A. Call your forecast variable AR. Optimize the sum of the absolute values of the errors. Use the method you learnt in the course and do NOT use additional packages.

Question 10
Calculate the average of the absolute value of the errors for both models (AM and AR).
Which model is better in forecasting?