IE 360 Statistical Forecasting and Time Series
Homework 4, due January 29th, 2021

Instructions: Please solve the following exercises using R (http://www.r-project.org/) or Python (https://www.python.org/). You are expected to use GitHub Classroom and present your work as an html file (i.e. web page) on your progress journals. There are alternative ways to generate an html page for you work:

- A Jupyter Notebook including your codes and comments. This works for R and Python, to enable using R scripts in notebooks, please check:
  - https://docs.anaconda.com/anaconda/navigator/tutorials/r-lang/
  - https://medium.com/@kyleake/how-to-install-r-in-jupyter-with-irkernel-in-3-steps-917519326e41

  Things are little easier if you install Anaconda (https://www.anaconda.com/). Please export your work to an html file. Please provide your *. ipynb file in your repository and a link to this file in your html report will help us a lot.

- A Markdown html document. This can be created using RMarkdown for R and Python-Markdown for Python

Note that html pages are just to describe how you approach to the exercises in the homework. They should include your codes. You are also required to provide your R/Python codes separately in the repository so that anybody can run it with minimal change in the code. This can be presented as the script file itself or your notebook file (the one with *.ipynb file extension).

The last and the most important thing to mention is that academic integrity is expected! Do not share your code (except the one in your progress journals). You are always free to discuss about tasks but your work must be implemented by yourself. As a fundamental principle for any educational institution, academic integrity is highly valued and seriously regarded at Boğaziçi University.

Stationarity of Turkish Electricity Consumption Data
Assume that we are interested in a predicting the tomorrow's daily electricity consumption of Turkey. The consumption series are made publicly available by EPİAŞ @
https://seffaflik.epias.com.tr/transparency/.

Please download the consumption series using the "realized consumption" menu item under the "consumption". That should bring you the following link:
https://seffaflik.epias.com.tr/transparency/tuketim/gerceklesen-tuketim/gercek-zamanli-tuketim.xhtml
You can use the data from 1st of January, 2017 till 8th of January, 2021. You can export the date-filtered data using the icon corresponding to "csv" file as a csv file.

As we have discussed in class, daily consumption series is not stationary due several reasonas such as religious holidays, special days and other types of seasonality (i.e. day of week effect). In this task, you are required to devise approaches to transform the series to obtain new series that is as stationary as possible. Please describe your approach and reasoning in details.

Forecasting with stationary series

Suppose we have achieved to obtain stationary series up to certain extent (achieving a stationary series may not be possible due to the problems discussed in class). Build autoregressive (AR) and moving average (MA) models on the aforementioned period and report test results on the upcoming 14 days (from 9th of January to 23rd of January in 2021). You can report the daily bias, daily mean absolute percentage error for each date. Moreover in order to evaluate the overall performance, you can make use of weighted mean absolute percentage error (https://ibf.org/knowledge/glossary/weighted-mean-absolute-percentage-error-wmape-299) over a 14-days period. Comment on your results.