IE 306 - Fall 2023
Assignment 2
Due date: 17 November 2023, Friday 17:00

We are asked to simulate the crowding level of a grocery store. The store has been recording hourly incoming visitors during the last two months. We are given *the entry times* of customers for each of the past two days. The data is given in the excel file that is provided to you separately. We will need to imitate the visitor inflow over time in the simulation model to be developed. In that respect, the task is to fit a distribution to the interarrival times of customers (i.e. time between two consecutive customers), if possible.

Using the data for **day 1 only**:

1. **Plot** the inter-arrival times based on the given set of observations. Is there an obvious pattern? Visually evaluate whether the data has stationary mean, or not. Repeat for the variance
2. One of the managers claims that it is safe to assume that inter-arrival times are distributed uniformly between 0 and 300 seconds. Test the validity of this claim using the Kolmogorov-Smirnov test with a significance level of 0.05.
3. Find sample mean, standard deviation and other descriptive statistics that you deem appropriate.
4. Draw frequency histograms of the data for 5, 10 and 20 seconds. Comment on the shape of the histograms.
5. Perform a chi-square test at a significance level of 0.05 with 10 intervals to test whether the data comes from an exponential distribution where the mean is as found in step 3.
6. Draw the QQ-plot to test whether the data comes from an exponential distribution.

Using the data for **day 2 only**:

1. **Plot** the inter-arrival times based on the given set of observations. Is there an obvious pattern? Visually evaluate whether the data has stationary mean, or not. Repeat for the variance
2. Explain what can be done to conduct an input analysis on this data set.

Using Excel is sufficient for this assignment. In obtaining QQ-plots with Excel you have to understand the logic behind drawing them. If you need to use a statistical package a good choice is the R project which is publicly available. Here is a tutorial on the use of R. As an alternative, you can also use Python.

Please do not use any other software or try to develop your own programs for the purposes of this assignment. Upload **a single zipped file** that contains a **well written report** along with your Excel and/or R codes through this interface. Alternatively, you can also submit a jupyter notebook that contains both your report and code.