

IE 306.02 Spring 2020 Assignment 2

Due Date: Friday, May 22th 2020

In order to analyze the service adequacy of a service system a simulation model has to be generated. The service system is subject to customer arrivals with random interarrival times. Customers arrive one by one. The interarrival times are observed in seconds for two days and the data is given in the excel file that is provided to you separately. In order to build the model first the interarrival time process has to be determined. 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 (and show why not if it is not possible).

1. One of the managers claims that it is safe to assume that inter-arrival times are distributed uniformly between 0 and 400 seconds. Test the validity of this claim using the Kolmogorov-Smirnov test with a significance level of 0.05.
2. Find sample mean, standard deviation and other descriptive statistics that you deem appropriate.
3. Draw frequency histograms of the data for 5, 10 and 20 second intervals. Comment on the shape of the histograms.
4. Perform a chi-square test at a significance level of 0.05 with 10 second intervals to test whether the data comes from an exponential distribution where the mean is as found in step 2.
5. Draw the QQ-plot to test whether the data comes from an exponential distribution.
6. **Plot** the inter-arrival times with respect to observation times. Is there an obvious pattern? Analyze visually if the data is stationary or not.
7. Test whether the data is autocorrelated. Plot the lag 1 and lag 2 differences. Find and report the correlation for lag 1 and 2 differences. Comment on the results.

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.

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.