IE 360 – Assignment 1

Spring'19

Due Date: 22.03.2019

1. We are interested in estimating $\theta = E[e^X]$ where X is a normal random variable with mean 1 and variance 3. Initially copy and paste the following command sequence in your console to generate your unique random sample of size 75.

    set.seed(last three digits of your student ID)
    X<-rnorm(.....)

   a) Simulate e^X with your random vector. Find an estimate for θ.
   b) Construct a 95% confidence interval for θ.
   c) Using your knowledge from probability theory course, find the exact value of θ (Hint: Solve the integral for the expected value).
   d) Is the solution of (c) inside the confidence interval you have found in (b) ?

2. The data set in the file "cars.txt" gives the speed of cars and the distances taken to stop. Using R,
   a) Draw a scatterplot to show the relationship between two sets of data.
   b) Calculate the correlation between the speed and the distance.
   c) Comment on your results in parts a and b.

3. The data set in the file "electricity.txt" gives monthly electricity production (1956-1965). Using R,
   a) Draw a time series plot.
   b) Draw an autocorrelation plot.
   c) Comment on your results in parts a and b.

4. Using the data in Q3,
   a) Construct a decomposition model. (If needed, you can do transformation on your time series).
   b) Remove the seasonality from your data. Draw a time series plot and autocorrelation plot for the deseasonalized data.
   c) Remove the trend in your deseasonalized data. Draw a time series plot and autocorrelation plot without trend.
   d) Comment on your results in parts b and c.

You need to submit a well-written report that includes your outputs, plots and comments. While writing your asssignment report, please try to follow the guidelines given in "Assignment Format.pdf" file, as much as possible. Write down all of your code and the necessary output.