IE 306 - Fall 2023

Assignment 4

Due date: 8 Januarry 2024, Monday 17:00

Question 1: A simulation model is used to estimate the steady state average waiting time of passengers in a new airport to be opened. In the attached file, the individual waiting time of passengers recorded during 21 replications are given.

a. Analyze the length of the warm-up period using moving average on replication 1, 5 and 12. Alternatively, analyze the length of the warm-up period using ensemble averages. Compare your findings, and decide on the warm-up period length to be used for the rest of the analysis.
b. One of the replications is much longer than the others (Replication no 1). Just using that run, build a 95% confidence interval for the average waiting time of customers
c. Use all replications to construct a 95% confidence interval for the average waiting time of customers
d. Compare your point estimates as well as the confidence intervals you constructed in (c) and (d). Discuss the reliability, precision, and potential bias in these estimates.

Question 2: A model is used to compare two alternative patient-MR machine scheduling approaches with respect to the average waiting time of patients at the radiology clinic of a hospital

a. The first alternative is run 30 times, and the second alternative is simulated 28 times using independent random number streams. Build a 95% confidence interval for the expected difference in the waiting times between these two alternatives. Can you draw a strong conclusion?
b. Later, the model is carefully redesigned and both alternatives are simulated using correlated random number streams using 30 random number seeds. Build a 95% confidence interval for the expected difference in the waiting times between these two alternatives. Can you draw a strong conclusion?
c. Compare your point estimates as well as the confidence intervals you constructed in (a) and (b). Discuss the reliability, precision, and potential bias in these estimates.

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.