Assignment 3

Course code	2WB50
Type	Random

Tasks:

Data Analysis (Task 1)

- [ ] Analyze the provided dataset.
- [ ] Fit distributions on the inter-arrival times and the service times of the **Fuel, Shop and Pay** stations in the queueing model and report summary statistics.
- [ ] Find estimates for all model parameters (which will be used in later tasks)

Simulation Implementation (Task 2)

- [ ] Implement a discrete-event simulation for the model.
- [ ] Simulate and report queue lengths and waiting times for Fuel, Shop, Pay stations.
- [ ] Calculate the mean, standard deviation and 95% CI of total time spent in the system.

Simulation Runs (Task 3)

- [ ] Run the simulation for **Task 2** with the input values given to us in the dataset.
- [ ] Run the simulation for **Task 2** with randomly sampled times based on estimated parameters in **Task 1.**

Scenario Analysis (Task 4)

- [ ] Analyze two out of three scenarios: No Blocking, Self-service Payment Terminals, or Four Lanes with One Pump Each.
- [ ] Create tables with simulation results for chosen scenarios.

Report and Code Submission

- Report within a 10-page limit (excluding, title, table of contents & appendix)
- Include source code as a separate ZIP file attachment.

Q&A

1. Should we find the mean for each attribute and then sample randomly?
    - Statistical tests should be performed.
    - histogram for frequency of values. (Bin sizes must be experimented with)
    - ECDFs
2. What are the distributions for each attribute?
    - Bernoulli trials for each choice (biased)
3. How are we supposed to rely on the means if the CIs are large?
4. What does it mean to run the simulation with the dataset?
    - Instead of sampling randomly, load the data from the dataset.
5. Is it a discreet event or continuous time simulation?
    - Continuous time process, described as a discreet event simulation
6. Simulate on time or number of customers?
    - This should be answered in the assignment
    - There should not be a difference