Assignment (20%)

Instructions:

1. This is an assignment done in groups of **4 or 5**. All group members must be from the same tutorial group only. Submit your group members' name to your respective tutor.

2. The last day for the submission is **Friday of Week 13 (14th Feb 2020 5pm)**. Please hand in the **FreeMat code** in CD together with the **hardcopy of the report**. Label your CD with the names of your group members and provide an e-mail address for contact purposes. All the group members MUST attend the demo. The **demo** will be arranged by respective tutor in **week 14**.

3. Creativity and extra effort will grant higher marks.

4. **Plagiarism** is not accepted under any circumstances. **Zero marks** will be given for any form of plagiarism such as copying from other group.

Queue system for ticket purchasing

[Note: For this assignment, use FreeMat only. For further details, please refer to Chapter 5].

Create a simulation system for ticket purchasing for movie, football, concerts and etc. The simulation system should be able to simulate the arrival of the customers and evaluate the results of the simulation. Assume that there are different types of tickets for sales. Firstly, create and display the tickets' information table, the table of the service time, inter-arrival time, ticket slot/day and ticket type, with an example given below:

Table of tickets' information

Day/slot	Total ticket type 1	Total ticket type 2			Total ticket type *n*

Table of service time

Service time	Probability	CDF	Range

Table of inter-arrival time

Inter arrival time	Probability	CDF	Range

Table of ticket slot/day

Ticket slot/day	Probability	CDF	Range

Table of ticket type

Ticket type	Probability	CDF	Range

Before the simulation starts, set the counters that are in operation and counters that are not in operation. During the simulation, more counters should be opened if there is a need (Set the conditions for this). Besides, you can create a special counter that exclusively for member only and so on. **Assume that the customers queue up in a line and will proceed to any counter(s) that are free to serve the customers**. End the simulation when all the customers have arrived or all the tickets are sold off.

For generation of random numbers for the service time, inter-arrival time and ticket type and etc, you can consider linear congruential generators and other generators. User should be able to choose the type of random number generator to be used before the simulation. Adjust the range of random numbers so that they are within the appropriate range. Exhibit the message for the counter operating status, arrival, departure of the customers and so on from time to time. For example:

Counter 1 and Counter 3 are in operation.
Arrival of first customer at minute 0 and 5 tickets were purchased.
Arrival of second customer at minute 2 and 2 tickets were purchased.
Departure of the first customer at minute 4.
Service for second customer started at minute 2.
Counter 2 started operation at minute 3.
Ticket type 1 is selling fast.

At the end of the simulation, display the results of the simulation such as the following:

n	RN for inter-arrival time	inter-arrival time	Arrival time	RN for ticket slot/day	ticket slot/day	RN for ticket type	ticket type	Number of tickets purchased	Total amount paid
1									
2									
3									
4									
5									

Counter 1:

n	RN for service time	Service time	Time service begins	Time service ends	Waiting time	Time spent in the system
1						
2						
5						
7						

Counter 2:

n	RN for service time	Service time	Time service begins	Time service ends	Waiting time	Time spent in the system
3						
4						
6						

⋮
⋮

Counter n:

n	RN for service time	Service time	Time service begins	Time service ends	Waiting time	Time spent in the system

Display the number of remaining tickets:

Day/slot	Number of remaining ticket			
	Type 1 ticket	Type 2 ticket	…	Type n ticket

At the end, evaluate the results of the simulation, such as (not limited to) average waiting time of a customer, average inter-arrival time, average arrival time, average time spent, probability that a customer has to wait in the queue, average service time for each counter and sales per counter (refer to the example in the notes).

Assignment Report

The written report should include but not limited to:

1. The details and discussion of your simulation system
2. The diagrams such as flow-chart and so on for the simulation and so on.
4. The main codes and algorithms with some explanations.
5. All the inputs and outputs of the simulation.