Simulation and modeling (Spring 2021)

Assignment 4

Due: April 10th 2022, at 11:59 pm

A store is run by one employee selling goods to arriving customers following a first-come first-serve scheme (single server single queue system)

Assume the inter-arrival times and service times for the store follow the distributions defined by the opposite tables.

The store owner asked you to help him make estimates for the following:

1- **Average waiting time for a customer**
2- **Maximum waiting time for a customer**
3- **Percentage of customers who need to wait in a queue**
4- **Percentage of customers who wait more than 10 minutes in the queue**
5- **Server utilization (percentage of time the employee is busy serving a customer)**
6- **Percentage of time the system is overcrowded (8 or more customers waiting in the queue)**

Interarrival Time [minute]	Probability	Cumulative Probability
1	0.125	0.125
2	0.125	0.250
3	0.125	0.375
4	0.125	0.500
5	0.125	0.625
6	0.125	0.750
7	0.125	0.875
8	0.125	1.000

Service Time [minute]	Probability	Cumulative Probability
1	0.10	0.10
2	0.20	0.30
3	0.30	0.60
4	0.25	0.85
5	0.10	0.95
6	0.05	1.00

In order to provide the required statistics, you want to write code to simulate the system. Each run should simulate service of 100 customers and you should repeat the simulation 1000 times to provide accurate values to the store owner. Your program should not print the simulation table, only the final values are printed after the 1000 runs.