

Assignment – 01

Single Channel Server Problem

Q1: Given the interarrival and service time of some customers:

Interarrival Time: $I_1= 1.2$, $I_2=0.5$, $I_3=0.5$, $I_4=1.6$, $I_5=0.3$, $I_6=1.1$, $I_7= 0.5$, $I_8= 1.0$, $I_9= 0.3$, $I_{10}= 0.2$

Service Time: $S_1=0.5$, $S_2=1.2$, $S_3=0.5$, $S_4=1.0$, $S_5=0.3$, $S_6=0.8$, $S_7= 1.1$, $S_8= 0.4$, $S_9= 0.4$, $S_{10}= 1.0$

(i) Show the number of customers in the queue and state of the server using X-Y plots.

Calculate -

- (i) number of customers in the queue,
- (ii) server utilization, (iii) total delay and (iv) average delay per customer.

Inventory Problem

Q2. Consider a company which sells refrigerators; company reviews inventory after every N days and maintains an inventory (M) based on following policy:

Order quantity = (Order-up-to-level) - (Ending inventory) +(Shortage quantity)

Assume that orders are placed at the end of the day. If there were shortage, then the required shortage will be provided to customers first when the order arrives. The number of refrigerators ordered each day is randomly distributed as shown in table 1 whereas the distribution of lead time (number of days taken to get the ordered quantity) is shown in table 2.

Table-1

Demand	Probability
0	.02
1	.34
2	.46
3	.04
4	.14

Table-2

Lead time(days)	Probability
1	.5
2	.3
3	.2

Suppose, M = 10 and N = 3 days. Construct a Table as shown below and show the simulation results for 9 days. Also calculate **average demand**. Assume simulation has been started with the inventory level at 4 refrigerators and an order for 6 refrigerators to arrive in 1 day time.

Day Beginning inventory, Demand, Ending Inventory, Shortage quantity, Order quantity, Lead time(days), Days until order arrives

Use random numbers to determine demand: 01, 96, 85, 90, 77, 81, 98, 32, 99

Use random numbers to determine lead time: 2, 6 10, 2, 4, 1, 7, 9, 3