

Simulation Exercise | MODSS

Worksheet 1 – Discrete Event Simulation - Barber Shop

We're aiming to simulate a setup like a server and a single waiting line, kind of like a small barber shop. Here are the system's features:

- The times between customer arrivals, A_1, A_2, \dots , are independently and identically distributed variables (follow a uniform probability distribution and take values between 1 and 19).
- Service times, S_1, S_2, \dots , are independently and identically distributed variables (follow a uniform probability distribution and take values between 1 and 22), independent of arrival times.
- A customer who arrives and finds the barber busy joins the end of the waiting line.
- A customer who arrives and finds the barber available starts being served immediately.
- When the barber finishes serving a customer, they attend to the customer at the front of the waiting line.

Consider that the simulation starts from an "empty" state.

- There are no customers.
- The barber is free.
- At time $t=0$, waiting begins for the first customer.

Consider as a stopping criterion the duration of the simulation, meaning the operation of the barber shop for a certain period of time. It's worth noting that the barber shop closes at this point, but all customers in the waiting line must be served.

The simulator should be implemented in a generic programming language (e.g., C++, Java, Python, etc.).

The expected results from the simulation are:

- Simulation run time
- Quantity of customers served
- Average waiting time in the queue
- Server utilization rate
- Average number of customers waiting
- Maximum customers queue size