Queueing

Exponential distribution

Types of arrivals

1. One at a time arrival or a group arrival
2. How long customers are willing to wait in a line

Last come first served: ie. Elevator

First come first served: most common

Multiple lines vs single line (M/M, M/1)

Queues (Short run vs long run): steady-state analysis

Arriving rate and service rate

INPUTS OF QUEUES

* Service rate (µ)
* Arrival rate (\lambda)
* Utilization (rho = lambda/(# of servers \* \mu)

Time average

* L: expected number of customers in the system
* LQ: customers in the queue
* Ls: customers in service
* P(all idle): p of all services are idle
* P(all busy): p of all services are busy

Customer average

* W: expected time spent in the system
* WQ: expected waiting time
* WS: expected serving time
* Little’s formula: L = \lambda \* W

Other relationships

* Expected number of customer: L = rho/(1-rho)