Sample Answers to In-Text Questions

# Module C: Waiting line models

## Discussion Questions

1. List some reasons why waiting lines occur.

Answer: Waiting lines occur because customers arrive in a random manner, the time it takes to service a customer varies, the time to wait depends on the number of people in front of them, and the service system delivery time varies.

1. What are some of the undesirable consequences of a waiting line?

Answer: Customer dis-satisfaction, delay in revenue, possible loss of customer,

1. What are the cost implications of managing waiting lines?

Answer: There are costs related to the waiting time, from loss of customers, to idle employees, to vehicles idling, etc. There are also costs of having extra capacity, such as providing the space, and equipment to the costs of purchasing additional capacity.

1. List the four key features of a waiting line system.

Answer: Characteristics are the customer population, the arrival pattern, and the service pattern.

1. The following are some real-world waiting line systems. Indicate whether it is a single- or multichannel, single-phase or multiphase, the queue discipline, and whether the calling populations is limited or unlimited:

System Channel Phase Discipline Population

a. A small drug store single single FIFO finite

b. A machine repair shop multi single Random infinite

c. Getting a driver’s license multi multi FIFO infinite

d. Beauty salon multi single Appt infinite

e. Laundromat multi single FIFO infinite

1. For most waiting line systems, the first-come, first-served (FCFS) rule is the most frequent assumption of queue discipline. Give some examples of waiting line systems where this assumption would not be appropriate.

Answer: In a hospital where some patients are critical, based on some other priority like longest waiting, or customer priority, or alphabetical, etc.

1. Give some examples of single-channel waiting line systems with constant service times.

Answer: Fast food drive up, oil change, routine services, etc.

1. Which of the two performance measures is larger: Ls or Lq? Explain.

Answer: Ls includes Lq plus those being served, so it would probably be larger.

1. What are the common performance measures calculated for evaluating waiting line systems?

Answer:.

* 1. Average number of customers in the waiting line system (waiting and being served).
  2. Average number of customers waiting in line.
  3. Average time a customer spends in the waiting line system (waiting time plus service time).
  4. Average time a customer spends waiting in line for service.
  5. Capacity utilization factor for the system.
  6. Probability that no customers are in the waiting line system, that is, the service facility is idle.
  7. Probability that a particular number of customers is in the waiting line system.

1. What does the term “steady state” mean in the context of a waiting line system?

Answer: The average arrival and service rates are rather steady and constant.

1. Define in your own words “Little’s Law.” Why is it applicable to a wide variety of queuing systems?

Answer: It means that the arrival rate is equal to the service rate approximately, so it is a steady flow.

1. What are some factors you should consider (in addition to choosing a queuing model) in managing real-world waiting lines?

Answer: You should consider the characteristics of waiting, the customer tolerance for waiting, whether the rate can be improved, the costs, and if you could keep the customer engaged or entertained during the wait so it is maybe less noticeable.

1. Choose a waiting line system that you commonly encounter in your daily life. How would you improve that system by using the knowledge gained from this module?

Answer: Student examples will vary