OPER 441: Modeling and Simulation
Exercises Sheet #2

Question1:

Customers arrive to a gas station with two pumps. Each pump can reasonably accommodate a total of two cars. If all the space for the cars is full, potential customers will balk (leave without getting gas).

1. What measures of performance will be useful in evaluating the effectiveness of the gas station?
2. Describe how you would collect the inter-arrival and service times of the customers necessary to simulate this system.

Question2:

Classify the systems as either being discrete or continuous:

a) Electrical Capacitor (You are interested in modeling the amount of current in a capacitor at any time t).
b) On-line gaming system. (You are interested in modeling the number of people playing Halo 4 at any time t.)
c) An airport. (You are interested in modeling the percentage of flights that depart late on any given day).
d) Parking lot
e) Level of gas in Fayetteville shale deposit
f) Printed circuit board manufacturing facility
g) Elevator system (You are interested in modeling the number of people waiting on each floor and traveling within the elevators.)
h) Judicial system (You are interested in modeling the number of cases waiting for trial.)
i) The in-air flight path of an airplane as it moves from an origin to a destination.

Question3:

The general goals of a simulation study often include:

(a). _____ of system alternatives and their performance measures across various factors (decision variables) with respect to some objectives.

(b). _____ of system behavior at some future point in time.

(c) The sequence of random numbers generated from a given seed is called a random number is called _____

(d) State three major methods of generating random variables from any distribution

Question4:

True or *False* Verification of the simulation model is performed to determine whether the simulation model adequately represents the real system.

OR 441: Simulation and Modeling
Tutorial Handout #2: Introduction to Simulation

Q.1

Define

1. Manufacturing system (TV manufacture)
2. Transportation system (Train System)
3. Health-Care system (a Clinic)
4. Service system (Call Center)

a. For each of the system find:

1. System Inputs
2. System Components/Elements
3. System Outputs
4. System Environment/ Boundary

b. Find the state, entity, the attributes of the entities?

Q.2:

Consider a **two-line** customer service call center

- If line is idle, any new call is accepted
- If line is busy, any new call is lost

call#	Arrival time	Service time		call #	Arrival time	Service time		call #	Arrival time	Service time
1	2	3		11	29	1		21	54	5
2	3	8		12	30	3		22	55	2
3	4	3		13	31	4		23	57	5
4	5	3		14	32	2		24	58	3
5	10	3		15	33	4		25	59	6
6	14	2		16	36	13		26	60	2
7	17	1		17	38	4		27	61	3
8	18	4		18	43	1		28	63	2
9	20	1		19	48	1		29	65	1
10	23	3		20	50	3		30	66	2

Do the discrete-event simulation and Complete the details of the calls center and compute:

1. Define the events of the system
2. The lost calls probability
3. Percentage of time **line-1** is busy
4. Average arrival rate
5. Average service time

Q.3:

Consider a parking lot with **three** parking spaces:

- If a space is available, any new car is accepted
- If all paces are full, any new car is lost

car #	Arrival time	Parking time
1	2.00	4.00
2	5.00	5.00
3	13.00	2.00
4	17.00	4.00
5	18.00	2.00
6	19.00	6.00
7	21.00	11.00
8	23.00	3.00
9	28.00	12.00
10	31.00	2.00
11	33.00	8.00
12	35.00	2.00
13	37.00	2.00
14	39.00	13.00
15	40.00	4.00
16	42.00	4.00
17	46.00	11.00
18	48.00	12.00
19	50.00	12.00
20	51.00	6.00

Do the discrete-event simulation and Complete the details of the parking lot:

1. Define the events of the system
2. The lost cars probability
3. Average arrival rate
4. Average parking time
5. Probability empty parking (No one in the parking)