

P_X F.6 Susan Sherer's grocery store has noted the following figures with regard to the number of people who arrive at the store's three checkout stands and the time it takes to check them out:

ARRIVALS/MIN.	FREQUENCY	SERVICE TIME IN MIN.	FREQUENCY
0	.3	1	.1
1	.5	2	.3
2	.2	3	.4
		4	.2

Simulate the utilization of the three checkout stands over 5 minutes, using the following random numbers: 07, 60, 77, 49, 76, 95, 51, 16, and 14. Record the results at the end of the 5-minute period. Start at time = 0.

P_X F.7 A warehouse manager at Mary Beth Marrs Corp. needs to simulate the demand placed on a product that does not fit standard models. The concept being measured is "demand during lead time," where both lead time and daily demand are variable. The historical record for this product, along with the cumulative distribution, appear in the table. Random numbers have been generated to simulate the next 5 order cycles; they are 91, 45, 37, 65, and 51. What are the five demand values? What is their average?

DEMAND DURING LEAD TIME	PROBABILITY	CUMULATIVE PROBABILITY
100	.01	.01
120	.15	.16
140	.30	.46
160	.15	.61
180	.04	.65
200	.10	.75
220	.25	1.00

P_X F.8 The time between arrivals at the drive-through window of Barry Harmon's fast-food restaurant follows the distribution given in the table. The service-time distribution is also given. Use the random numbers provided to simulate the activity of the first 4 arrivals. Assume that the window opens at 11:00 A.M. and that the first arrival occurs afterward, based on the first interarrival time generated.

TIME BETWEEN ARRIVALS		SERVICE TIME	
ARRIVALS	PROBABILITY	SERVICE TIME	PROBABILITY
1	.2	1	.3
2	.3	2	.5
3	.3	3	.2
4	.2		

Random numbers for arrivals: 14, 74, 27, 03

Random numbers for service times: 88, 32, 36, 24

At what time does the fourth customer leave the system?

P_X F.9 Phantom Controls monitors and repairs control circuit boxes on elevators installed in multistory buildings in downtown Chicago. The company has the contract for 108 buildings. When a box malfunctions, Phantom installs a new one and rebuilds the failed unit in its repair facility in Gary, Indiana. The data for failed boxes over the last 2 years is shown in the following table:

NUMBER OF FAILED BOXES PER MONTH	PROBABILITY
0	.10
1	.14
2	.26
3	.20
4	.18
5	.12

Simulate 2 years (24 months) of operation for Phantom and determine the average number of failed boxes per month from the simulation. Was it common to have fewer than 7 failures over 3 months of operation?