

Simulating Two Random Variables by Hand

On Monday morning, a repair shop has 10 cars being repaired or waiting for repairs. Each day, the number of cars arriving for repair follows the first probability distribution shown at left. The number of repairs completed per day follows the second probability distribution shown at right.

Cars Arriving	Probability
7	.25
8	.30
9	.30
10	.15

Repairs Completed	Probability
6	0.10
7	0.55
8	0.25
9	0.10

Simulate three days changes in the number of cars in the shop (being repaired or waiting for repairs). Use the following random numbers for cars arriving: 0.63, 0.21, 0.28, and for repairs completed: 0.73, 0.88, 0.47.

Day	Random #	Arriving	Random #	Completed	Cars at end of day
Cars at start of day					15
Monday	10				
Tuesday					
Wednesday					

How many cars are in the shop at the end of Wednesday?

Solution:

Random number ranges for arrivals:

Cars Arriving	Probability	Random number ranges
7	.25	from 0 to 0.2499
8	.30	from 0.25 to 0.5499
9	.30	from 0.55 to 0.8499
10	.15	from 0.85 to 1.0

Since 0.63 is between 0.55 and 0.8499, 9 cars arrive on Monday
 Since 0.21 is between 0 and 0.2499, 7 cars arrive on Tuesday
 Since 0.28 is between 0.25 and 0.5499, 8 cars arrive on Wednesday

Random number ranges for completions:

Repairs Completed	Probability	Random number ranges
6	0.10	from 0 to 0.0999
7	0.55	from 0.10 to 0.6499
8	0.25	from 0.65 to 0.8999
9	0.10	from 0.90 to 1.0

Since 0.73 is between 0.65 and 0.8999, 8 repairs are completed on Monday
 Since 0.88 is between 0.65 and 0.8999, 8 repairs are completed on Tuesday
 Since 0.47 is between 0.10 and 0.6499, 7 repairs are completed on Wednesday

Day	Random #	Arriving	Random #	Completed	Cars at end of day
Cars at start of day					10
Monday	10	9	0.73	8	10+9-8=11
Tuesday	11	7	0.88	8	11+7-8=10
Wednesday	10	8	0.47	7	10+8-7=11

Answer: Eleven cars are in the shop at the end of Wednesday.