Generate Random Variates using the Inverse Transform Method

Date:

Q: Five Observations of interarrival times of the customer (in minutes) to a shopping mart are given below:

2.76, 1.83, 0.80, 1.45, 1.24.

Generate the random variates from the interarrival time distribution. Given the random number as 0.71

Data = [2.76, 1.83, 0.80, 1.45, 1.24]

Sorted data = [0.80, 1.24, 1.45, 1.83, 2.76]. $\therefore a_i = \frac{x_i - x_{i-1}}{1/n}$

i	Interval $x_{i-1} < x \leq x_i$	Probability 1/n	C.P i/n	Slope a_i
1	$0 < x \leq 0.80$	1/5 = 0.2	0.2	$\frac{0.80-0}{0.2} = 4$
2	$0.80 < x \leq 1.24$	0.2	0.4	2.2
3	$1.24 < x \leq 1.45$	0.2	0.6	1.05
4	$1.45 < x \leq 1.83$	0.2	0.8	1.90
5	$1.83 < x \leq 2.76$	0.2	1.0	4.65

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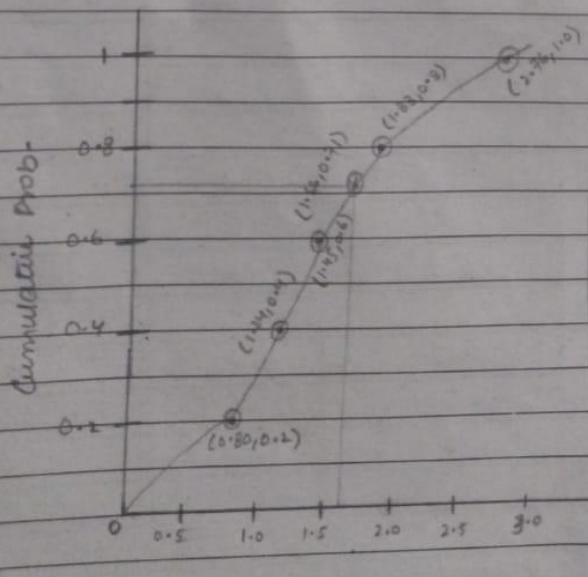
Given initial seed 0.71. It lies blw interval 3 & 4.

$$\therefore X = F^{-1}(R) = X_{i-1} + a_i\left(R - \frac{i-1}{n}\right).$$

$$X = 1.45 + 1.90\left(0.71 - \frac{3}{5}\right)$$

$$X = 1.659 \approx 1.66.$$

R = 0.71
X = 1.66



Point		x	y
1	⊙	0.80	0.2
2	⊙	1.24	0.4
3	⊙	1.45	0.6
4	⊙	1.83	0.8
5	⊙	2.76	1.0
6	⊗	1.66	0.71