KS Test (Test for Uniformity)

Steps:-

S1: Define the hypothesis for uniformity

$H_0: R_i \sim U[0,1]$

$H_1: R \not\sim U[0,1]$

S2:- Arrange data in ascending orders

$R_i = 1^m$ smallest integers

$R_1 \leq R_2 \leq R_n$

S3:- Compute D^+ & D^-

$$D^+ = \max \left\{ \left(\frac{i}{N}\right) - R_i \right\} \quad 1 \leq i \leq N$$

$$D^- = \max \left\{ R_i - \left(\frac{i-1}{N}\right) \right\} \quad 1 \leq i \leq N$$

S4 Compute $D_{Calc} = \text{Max}(D^+, D^-)$

S5, Compute D_{tab} for specific α value.

$D_{tab} = D_{\alpha, N}$

S6: If $D_{cal} < D_{tab}$ accept H_0,

else reject H_0.

Numerical 1

The sequence of numbers 0.63, 0.49, 0.24, 0.57, 0.71, 0.89 has been generated. At $\alpha = 5\%$ use KS Test to check the uniformity

S1 Define Hypothesis

H_0: R ~ U [0,1]

H_1: R $\not\sim$ U [0,1]

S2 Arrange no's in ascending order

0.24, 0.49, 0.57, 0.63, 0.71, 0.89

S3: Compute D^+ & D^-

i	1	2	3	4	5	6
R(i)	0.24	0.49	0.57	0.63	0.71	0.89
i/N	.17	.33	.50	.67	0.83	1
(i/N - R_i)	-ve	-ve	-ve	.04	.12	.11
R(i) - (i-1)/N	.24	.32	.24	.13	.04	.06

Here N = 6

$D^+ = \max(0.4, .12, .11) = 0.12$

$D^- = \max(.24, .32, .24, .13, 0.4, .06) = 0.32$

$S_4 = D_{calc} = \max(D^+, D^-) = \max(0.13, 0.32)$

$D_{calc} = 0.32$

S5. $D_{tab} = D_{\alpha,N} = D_{0.05,6} = 0.521$ $N=6$

S6 Since $D_{calc} < D_{tab}$

So accept H_0.

Hence the generated sequence is uniform.

Numerical 2 Sequence generated

0.81, 0.14, 0.43, 0.05, 0.93, 0.44

confidence level 90%.

$\alpha = 10\%$

Random No sequence:-

0.23, 0.77, 0.078, 0.93, 0.2, 0.56, 0.41, 0.1, 0.37, 0.29, 0.67, 0.88