Linear Congruential Method

Random Number Generation:

- Random number = Uniform (0,1)
- Random Variate = other distribution
  = Function (Random Number)

$$Z_n = (aZ_{n-1} + C) \bmod m$$

$$U_n = Z_n / m$$

Where,

Z_n = is the seed of elements.

a = is the multiplier

C = is the increment

m = is the modulo

Example-1: **Using LCM, generate a sequence of random number with Z_0=7, a= 5, c=3, m=16.**

$Z_1 = (a.Z_0 + C)\%m = (5*7+3)\%16 = 38\%16 = 6$

$U_1 = 6/16 = 0.375.$

$Z_2 = (a.Z_1 + C)\%m = (5*6+3)\%16 = 1$

$U_2 = 1/16 = 0.0625$

$Z_3 = (a.Z_2 + C)\%m = (5*1+3)\%16 = 8$

$U_3 = 8/16 = 0.5$

Z_4= (a.Z_3+C)%m = (5*8+3)%16 = 11

U4= 11/16= 0.6875

Z_5= (a.Z_4+C)%m = (5*11+3) = 10

U5= 10/16= 0.625

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Z_{16}=7

7,6,1,8,11,10,5,12,15,14,9,0,3,2,13,4,7,6……

Generate a random sample size of 5 using LCM.

$X_{i+1} = (2X_i+9)$ % 6 where $X_0=5$

i	X_i	$X_{i+1}= (3X_i+6)\%10$	Random Number
0	1	$X_1= (3+6)\%10$ $= 9\%10 = 9$	9

			Which is 1st random number
1	**9**	**X_1= (3*9+6)%10 = (27+6)%10 3**	**3**
2	**3**	**X_1= (3*3+6)%10 =15%10=5**	**5**
3	**5**	**X_1= (3*5+6)%10 =21%10=1**	**1**
4	**1**	**X_1= (3+6)%10 =9%10=9**	**9**

Therefore 5 random sequences are ***9,3,5,1,9***

So, random numbers are: 0.9, 0.3, 0.5, 0.1, 0.9