

## Assignment- 6 (Odd Set)

1. Suppose you have a 5 \* 5 array. Each cell of the array is either 0 (Dead) or 1 (Alive) [20]

Now The value of a given cell at the next instant of time depends on the state of its neighbours at the previous time step. There are four rules:

1. If a cell is Alive and has fewer than two neighbours that are Alive, it dies on the next time step.
2. If a cell is Alive and has exactly two neighbours that are Alive, it remains Alive on the next time step.
3. If a cell is alive and has more than two neighbours that are Alive, it dies on the next time step.
4. If a cell is Dead and has two or three neighbours that are alive, it turns Alive on the next time step.

Example:

Time -0	Time -1	Time -2	Time-3
0 1 0 0 0 0 0 1 0 0 0 1 1 0 1 0 1 0 0 1 0 0 0 0 0	0 0 1 0 0 1 0 0 1 0 1 0 0 0 0 1 1 1 1 0 0 0 0 0 0	0 1 0 1 0 0 1 1 0 0 0 0 0 1 1 1 0 1 0 0 1 1 1 1 0	1 1 0 0 0 1 1 0 0 1 1 0 0 0 0 1 0 0 0 1 1 0 0 1 0

So Use any programming language to solve this problem. Simulate your code up to 20-time steps and print the array at each time step. Use the above array at time = 0 for initialization.

2. Suppose G1, G2 and G3 are two seperate Congruential Generators. The specification and recursive relation of both generators are given below: [10]

G1	$Z_{1,i} = (13Z_{1,i-1} + Z_{1,i-2} + 3) \bmod 16$ , $Z_{1,0} = 12$ , $Z_{1,1} = 7$ ( $Z_{1,i}$ means $Z_i$ of first CG )
G2	$Z_{2,i} = (12Z_{2,i-1}^2 + 13Z_{2,i-2}) \bmod 17$ , $Z_{2,0} = 3$ , $Z_{2,1} = 5$

	( $Z_{2,i}$ means $Z_i$ of second CG)
G3	$Z_{3,i} = (Z_{3,i-1}^3 + Z_{3,i-2}) \bmod 15$ , $Z_{3,0}=2$ , $Z_{3,1}=7$ ( $Z_{3,i}$ means $Z_i$ of Third CG)

Now G1, G2 and G3 are combined together to generate a random number.  
Write a code to implement Wichman / Hill Method. Generate 100, 1000 and 5000 random numbers. Show a histogram,

X -axis: index of a random number, i

Y-axis: the random number  $Z_i$