

First Name : Abhishek

Last Name : Ponda

CWID : 10478684

Purpose : Assignment - HW07

```
In [1]: # Import Packages
```

```
In [2]: import matplotlib.pyplot as plt
import networkx as nx
import numpy as np
from numpy.linalg import matrix_power
```

```
In [3]: # Define Graph
```

```
In [4]: G=nx.DiGraph()
```

```
In [5]: pgs = ["A","B","C","D","E","F"]
G.add_nodes_from(pgs)
print("Nodes of graph: ")
print(G.nodes())
```

Nodes of graph:

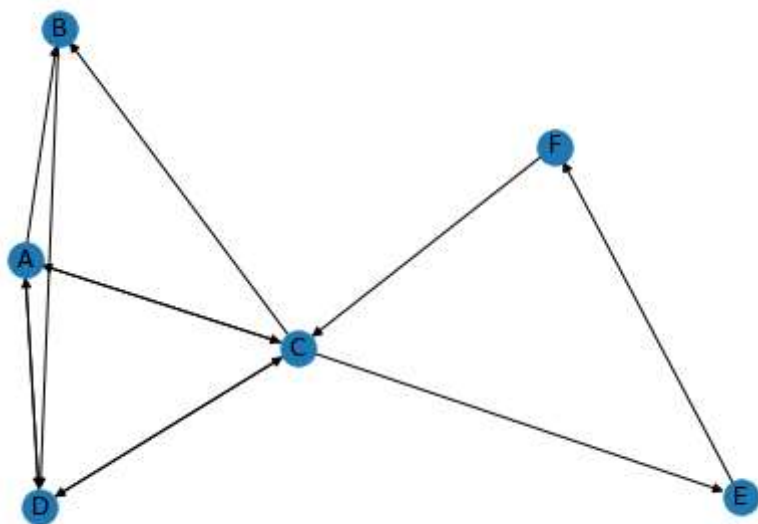
['A', 'B', 'C', 'D', 'E', 'F']

```
In [6]: G.add_edges_from([
('A','B'),('A','C'),('A','D'),
('B','D'),
```

```
(('C','A'),('C','B'),('C','D'),('C','E'),
 ('D','A'),('D','C'),
 ('E','F'),
 ('F','C')
])
```

```
In [ ]: G.edges()
```

```
In [7]: nx.draw(G, with_labels = True)
plt.show()
```



```
In [8]: adj_mt = np.array([[0,0,1,1,0,0],
                           [1,0,1,0,0,0],
                           [1,0,0,1,0,1],
                           [1,1,1,0,0,0],
                           [0,0,1,0,0,0],
                           [0,0,0,0,1,0]]
        )
print('Adjacency Matrix:' )
print(adj_mt)
tran_mt = np.array([[0,0,1/4,1/2,0,0],
                    [1/3,0,1/4,0,0,0],
```

```

    [1/3,0,0,1/2,0,1],
    [1/3,1,1/4,0,0,0],
    [0,0,1/4,0,0,0],
    [0,0,0,0,1,0]]
)

```

```

print('Transition Matrix:' )
print( tran_mt)

```

```

rank0 = np.array([1/6, 1/6, 1/6, 1/6, 1/6, 1/6,])
rank0

```

Adjacency Matrix:

```

[[0 0 1 1 0 0]
 [1 0 1 0 0 0]
 [1 0 0 1 0 1]
 [1 1 1 0 0 0]
 [0 0 1 0 0 0]
 [0 0 0 0 1 0]]

```

Transition Matrix:

```

[[0.      0.      0.25      0.5      0.      0.      ]
 [0.33333333 0.      0.25      0.      0.      0.      ]
 [0.33333333 0.      0.      0.5      0.      1.      ]
 [0.33333333 1.      0.25      0.      0.      0.      ]
 [0.      0.      0.25      0.      0.      0.      ]
 [0.      0.      0.      0.      1.      0.      ]]

```

Out[8]: array([0.16666667, 0.16666667, 0.16666667, 0.16666667, 0.16666667, 0.16666667])

In [9]:

```

print(rank0.T)
rank1=np.matmul(tran_mt,rank0.T)
print(rank1)
rank2=np.matmul(tran_mt,rank1)
print(rank2)

```

```

[0.16666667 0.16666667 0.16666667 0.16666667 0.16666667 0.16666667]
[0.125      0.09722222 0.30555556 0.26388889 0.04166667 0.16666667]
[0.20833333 0.11805556 0.34027778 0.21527778 0.07638889 0.04166667]

```

In [10]:

```

tran_mt50=matrix_power(tran_mt, 50)
rank51=np.matmul( tran_mt50,rank1)
print(rank51)

```

```

[0.2      0.13333333 0.26666667 0.26666667 0.06666667 0.06666667]

```

In [ ]: