PracticalExam1

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1 Graph Theory Practical Exam I

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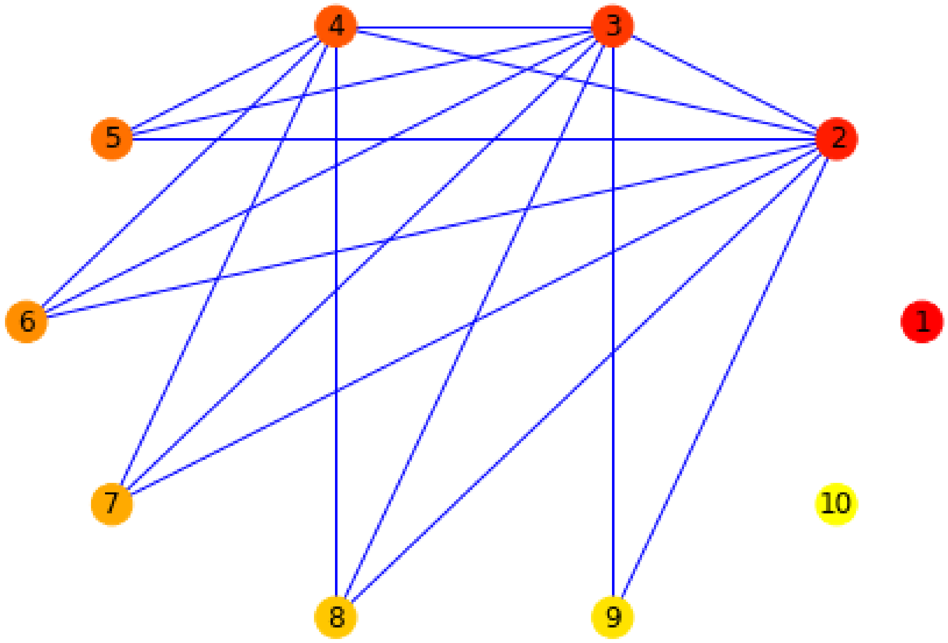
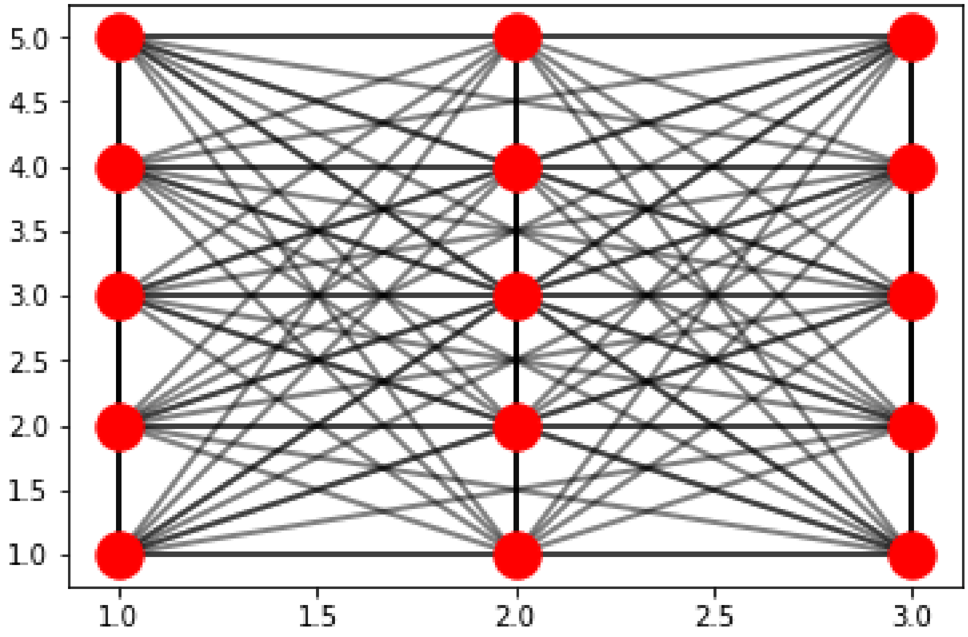
```
In [1]: import networkx as nx
        import matplotlib.pyplot as plt
```

```
In [61]: # 1
         G=nx.Graph()
         G.add_nodes_from(range(1,11))
         n=0
         for i in range(1,11):
             for j in range(i+1,10):
                 n=n+1
                 if n>20:
                     break
                 else:
                     G.add_edge(i+1,j)

         nx.draw_circular(G,with_labels=True,node_color=range(10),edge_color="b",cmap=plt.cm.au
         plt.show()
```

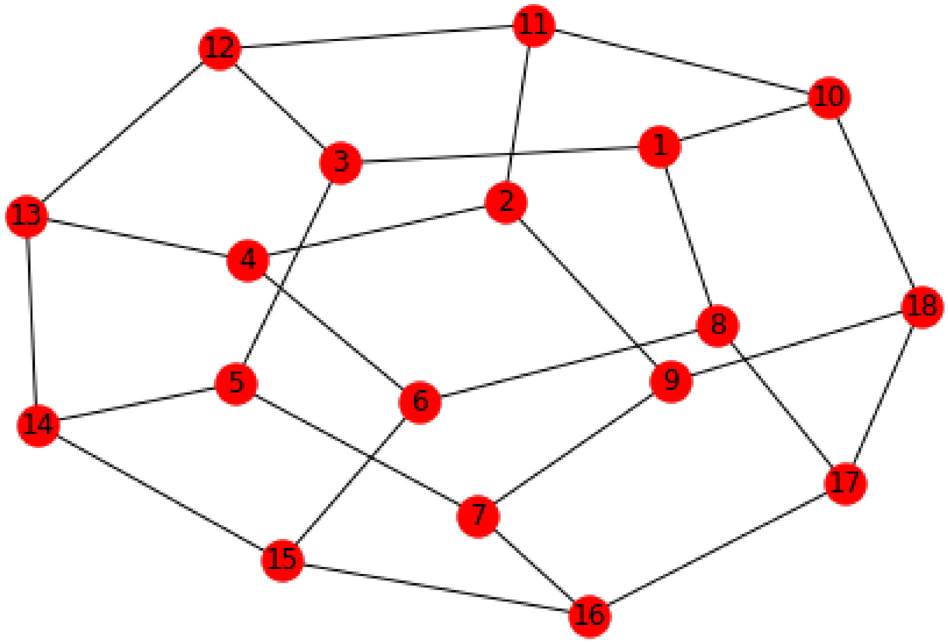


```
In [22]: # 2
         G=nx.complete_graph(15)
         pos={0:(1,1),
             1:(1,2),
             2:(1,3),
             3:(1,4),
             4:(1,5),
             5:(2,1),
             6:(2,2),
             7:(2,3),
             8:(2,4),
             9:(2,5),
             10:(3,1),
             11:(3,2),
             12:(3,3),
             13:(3,4),
             14:(3,5)}
         nx.draw_networkx_nodes(G,pos)
         nx.draw_networkx_edges(G,pos,alpha=0.5,width=2)
         plt.show()
         print("Adjacency List",nx.to_dict_of_lists(G))
         print("Adjacency Matrix",nx.adj_matrix(G).todense())
```



```
Adjacency List {0: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14], 1: [0, 2, 3, 4, 5, 6, 7, 8
Adjacency Matrix [[0 1 1 1 1 1 1 1 1 1 1 1 1 1 1]
 [1 0 1 1 1 1 1 1 1 1 1 1 1 1 1]
 [1 1 0 1 1 1 1 1 1 1 1 1 1 1 1]
 [1 1 1 0 1 1 1 1 1 1 1 1 1 1 1]
 [1 1 1 1 0 1 1 1 1 1 1 1 1 1 1]
 [1 1 1 1 1 0 1 1 1 1 1 1 1 1 1]
 [1 1 1 1 1 1 0 1 1 1 1 1 1 1 1]
 [1 1 1 1 1 1 1 0 1 1 1 1 1 1 1]
 [1 1 1 1 1 1 1 1 0 1 1 1 1 1 1]
 [1 1 1 1 1 1 1 1 1 0 1 1 1 1 1]
 [1 1 1 1 1 1 1 1 1 1 0 1 1 1 1]
 [1 1 1 1 1 1 1 1 1 1 1 0 1 1 1]
 [1 1 1 1 1 1 1 1 1 1 1 1 0 1 1]
 [1 1 1 1 1 1 1 1 1 1 1 1 1 0 1]
 [1 1 1 1 1 1 1 1 1 1 1 1 1 1 0]]
```

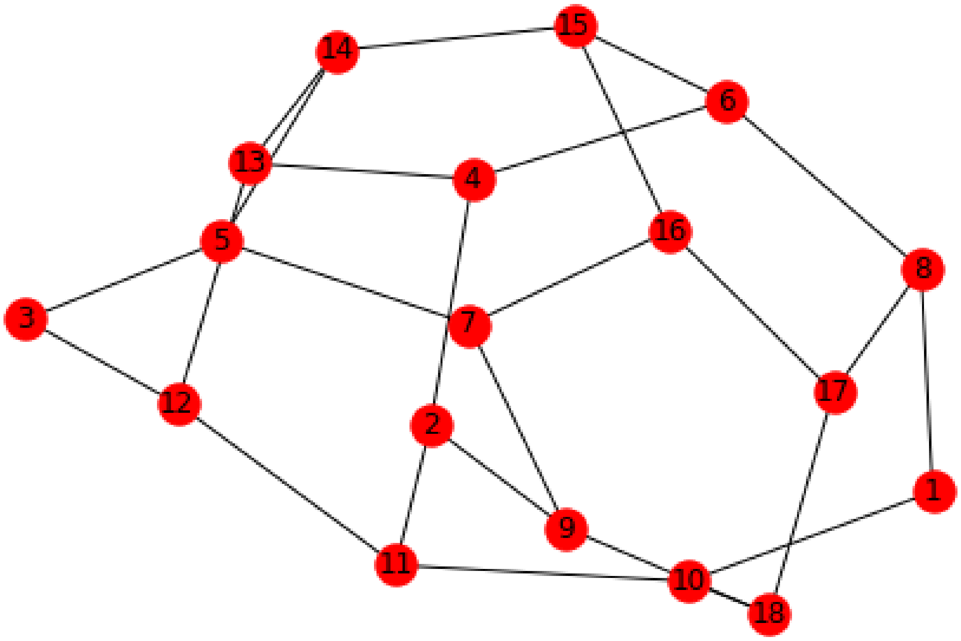
```
In [32]: # 3
         G=nx.Graph()
         G.add_nodes_from(range(1,19))
         G.add_cycle([1,3,5,7,9,2,4,6,8])
         G.add_cycle([10,11,12,13,14,15,16,17,18])
         for i in range(1,10):
             G.add_edge(i,i+9)
         #shells=([1,3,5,7,9,2,4,6,8],[10,11,12,13,14,15,16,17,18])
         nx.draw(G,with_labels=True)
         plt.show()
```



```
In [33]: print("Spanning Graph of G")
         G.remove_edge(1,3)
         nx.draw(G,with_labels=True)
         plt.show()
```

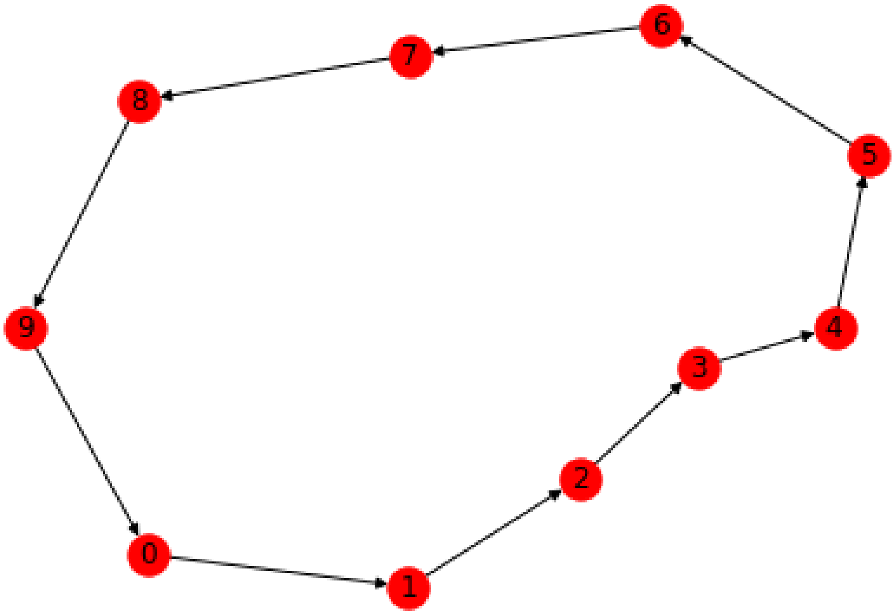
```
Spanning Graph of G
```

```
C:\Users\Snigdha\Anaconda3\lib\site-packages\networkx\drawing\nx_pylab.py:611: MatplotlibDeprec
  if cb.is_numlike(alpha):
```



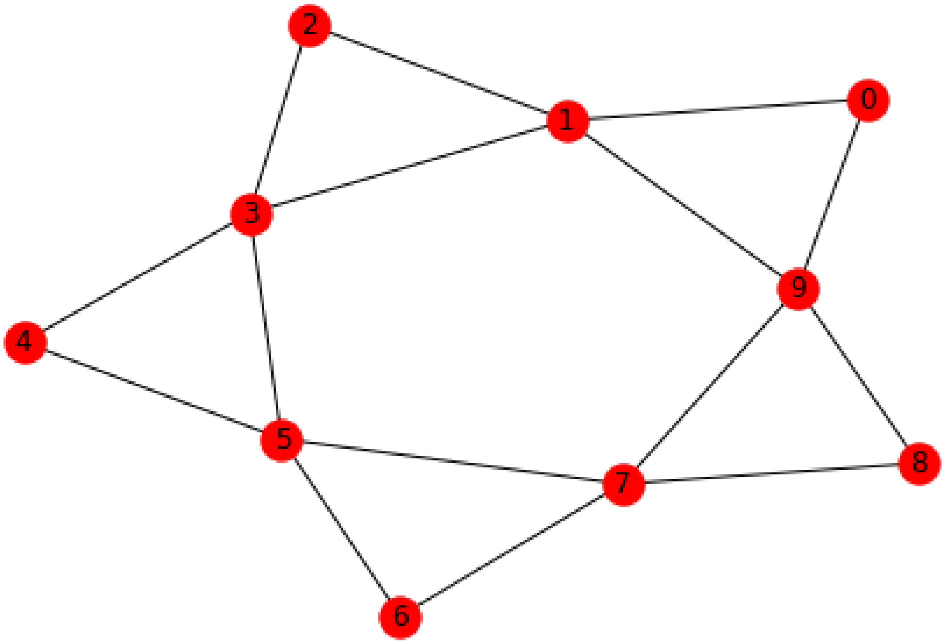
```
In [39]: # 4
         G=nx.DiGraph()
         G.add_nodes_from(range(0,10))
         for i in range(0,9):
             G.add_edge(i,i+1)
         G.add_edge(9,0)
         print("Vertices of the graph",G.nodes)
         print("Edges of the graph",G.edges)
         nx.draw(G,with_labels=True)
```

```
Vertices of the graph [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
Edges of the graph [(0, 1), (1, 2), (2, 3), (3, 4), (4, 5), (5, 6), (6, 7), (7, 8), (8, 9), (9
```



```
In [47]: # 5
         G=nx.Graph()
         G.add_nodes_from(range(0,10))
         for i in range(1,11):
             G.add_edge(i%10,(i+1)%10)
         G.add_edges_from([(1,3),(3,5),(5,7),(7,9),(1,9)])
         print("Edge List", G.edges)
         print("Vertex List", G.nodes)
         print("Degree Sequence")
         deg=[G.degree(v) for v in G]
         deg.sort(reverse=True)
         print(deg)
         nx.draw(G,with_labels=True)
```

```
Edge List [(0, 9), (0, 1), (1, 2), (1, 3), (1, 9), (2, 3), (3, 4), (3, 5), (4, 5), (5, 6), (5,
Vertex List [0, 1, 2, 3, 4, 5, 6, 7, 8, 9]
Degree Sequence
[4, 4, 4, 4, 4, 2, 2, 2, 2, 2]
```



```
In [ ]:
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