End Semester Practical Examination

1740256

Jeevan Koshy

Set - 2

In [1]:

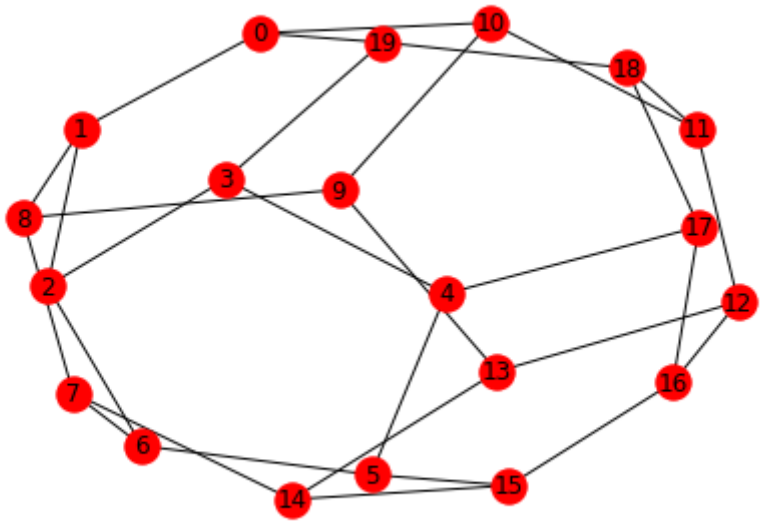
```
import networkx as nx
import matplotlib.pyplot as plt
```

1. Construct the dodecahedral graph using different layouts.

In [3]:

```
G = nx.dodecahedral_graph()
nx.draw(G,with_labels=True)
plt.show()
```

```
C:\Users\Jeevan\Anaconda3\lib\site-packages\networkx\drawing\nx_pylab.py:12
6: MatplotlibDeprecationWarning: pyplot.hold is deprecated.
    Future behavior will be consistent with the long-time default:
    plot commands add elements without first clearing the
    Axes and/or Figure.
  b = plt.ishold()
C:\Users\Jeevan\Anaconda3\lib\site-packages\networkx\drawing\nx_pylab.py:13
8: MatplotlibDeprecationWarning: pyplot.hold is deprecated.
    Future behavior will be consistent with the long-time default:
    plot commands add elements without first clearing the
    Axes and/or Figure.
  plt.hold(b)
C:\Users\Jeevan\Anaconda3\lib\site-packages\matplotlib\__init__.py:917: User
Warning: axes.hold is deprecated. Please remove it from your matplotlibrc an
d/or style files.
  warnings.warn(self.msg_depr_set % key)
C:\Users\Jeevan\Anaconda3\lib\site-packages\matplotlib\rcsetup.py:152: UserW
arning: axes.hold is deprecated, will be removed in 3.0
  warnings.warn("axes.hold is deprecated, will be removed in 3.0")
```



2. Draw a graph of 10 vertices & 20 edges. Prepare its adjacency matrix, incidence matrix and degree sequence. Also check whether it is Eulerian?

In [49]:

```
G = nx.Graph()
e1 = (0,1)
e2 = (1,2)
e3 = (5,10)
e4 = (2,3)
e5 = (3,4)
e6 = (4,5)
e7 = (5,6)
e8 = (6,7)
e9 = (7,8)
e10 = (8,9)
e11 = (9,10)
e12 = (0,2)
e13 = (2,4)
e14 = (4,6)
e15 = (6,8)
e16 = (8,10)
e17 = (0,4)
e18 = (4,8)
e19 = (3,6)
e20 = (3,9)
G.add_edges_from([e1,e2,e3,e4,e5,e6,e7,e9,e10,e11,e12,e13,e14,e15,e16,e17,e18,e19,e20])
nx.draw(G)
plt.show()
print("It's adjacency matrix is: \n",nx.adj_matrix(G))
print("It's incidence matrix is: \n",nx.incidence_matrix(G))
if(nx.is_eulerian(G) == True):
    print("It is a eulerian Graph")
else:
    print("It is not a eulerian Graph")
print(nx.info(G))
```

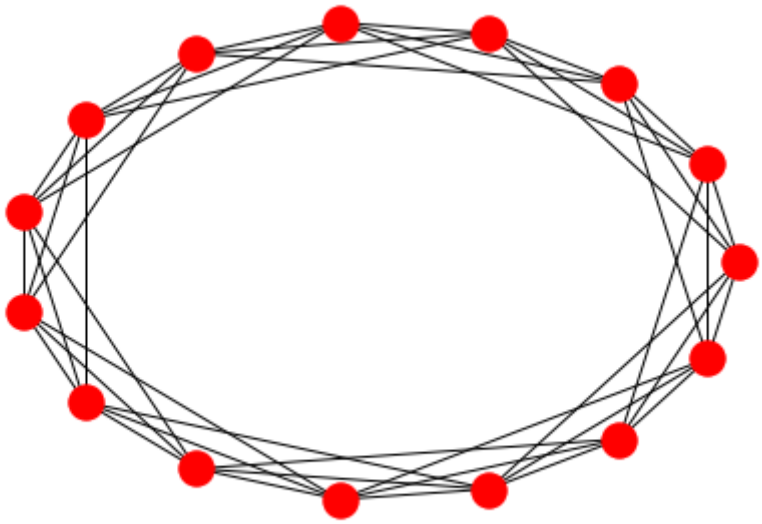
```
  (6, 2)        1
  (6, 3)        1
  (6, 5)        1
  (6, 7)        1
  (6, 9)        1
  (7, 3)        1
  (7, 5)        1
  (7, 6)        1
  (7, 9)        1
  (8, 9)        1
  (9, 4)        1
  (9, 6)        1
  (9, 7)        1
  (9, 8)        1
  (9, 10)       1
  (10, 4)       1
  (10, 5)       1
  (10, 9)       1
It's incidence matrix is:
   (0, 0)       1.0
```

3. Draw the third power of a cycle on 15 vertices. Also find its adjacency list & edge list.

In [52]:

```
n = 15
V = [(i,(i+1)%n) for i in range(n)]
V += [(i,(i+2)%n) for i in range(n)]
V += [(i,(i+3)%n) for i in range(n)]
g = nx.Graph(V)
nx.draw_circular(g)
plt.show()
X = nx.adj_matrix(g)
print(X.todense())
```

```
C:\Users\Jeevan\Anaconda3\lib\site-packages\networkx\drawing\nx_pylab.py:12
6: MatplotlibDeprecationWarning: pyplot.hold is deprecated.
    Future behavior will be consistent with the long-time default:
    plot commands add elements without first clearing the
    Axes and/or Figure.
  b = plt.ishold()
C:\Users\Jeevan\Anaconda3\lib\site-packages\networkx\drawing\nx_pylab.py:13
8: MatplotlibDeprecationWarning: pyplot.hold is deprecated.
    Future behavior will be consistent with the long-time default:
    plot commands add elements without first clearing the
    Axes and/or Figure.
  plt.hold(b)
C:\Users\Jeevan\Anaconda3\lib\site-packages\matplotlib\__init__.py:917: User
Warning: axes.hold is deprecated. Please remove it from your matplotlibrc an
d/or style files.
  warnings.warn(self.msg_depr_set % key)
C:\Users\Jeevan\Anaconda3\lib\site-packages\matplotlib\rcsetup.py:152: UserW
arning: axes.hold is deprecated, will be removed in 3.0
  warnings.warn("axes.hold is deprecated, will be removed in 3.0")
```



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

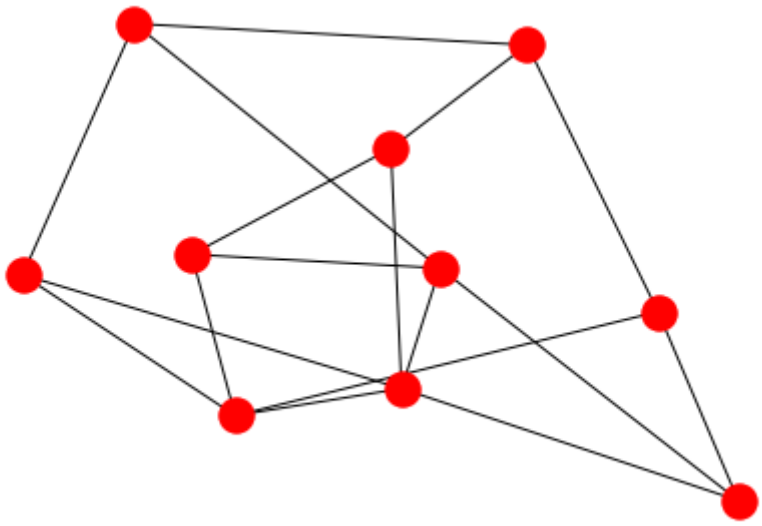
```
[0 0 0 1 1 1 0 1 1 1 0 0 0 0 0]
[0 0 0 0 1 1 1 0 1 1 1 0 0 0 0]
[0 0 0 0 0 1 1 1 0 1 1 1 0 0 0]
[0 0 0 0 0 0 1 1 1 0 1 1 1 0 0]
[0 0 0 0 0 0 0 1 1 1 0 1 1 1 0]
[0 0 0 0 0 0 0 0 1 1 1 0 1 1 1]
[1 0 0 0 0 0 0 0 0 1 1 1 0 1 1]
[1 1 0 0 0 0 0 0 0 0 1 1 1 0 1]
[1 1 1 0 0 0 0 0 0 0 0 1 1 1 0]]
```

4. Draw the generalised Petersen graph $P(10, 4)$. Also, draw any orientation of this graph.

In [48]:

```
pg = nx.petersen_graph()
pg.add_nodes_from([0,1,2,3,4,5,6,7,8,9])
pg.add_edge(1,2)
pg.add_edge(1,5)
pg.add_edge(1,3)
pg.add_edge(1,6)
nx.draw(pg)
plt.show()
```

```
C:\Users\Jeevan\Anaconda3\lib\site-packages\networkx\drawing\nx_pylab.py:12
6: MatplotlibDeprecationWarning: pyplot.hold is deprecated.
    Future behavior will be consistent with the long-time default:
    plot commands add elements without first clearing the
    Axes and/or Figure.
  b = plt.ishold()
C:\Users\Jeevan\Anaconda3\lib\site-packages\networkx\drawing\nx_pylab.py:13
8: MatplotlibDeprecationWarning: pyplot.hold is deprecated.
    Future behavior will be consistent with the long-time default:
    plot commands add elements without first clearing the
    Axes and/or Figure.
  plt.hold(b)
C:\Users\Jeevan\Anaconda3\lib\site-packages\matplotlib\__init__.py:917: User
Warning: axes.hold is deprecated. Please remove it from your matplotlibrc an
d/or style files.
  warnings.warn(self.msg_depr_set % key)
C:\Users\Jeevan\Anaconda3\lib\site-packages\matplotlib\rcsetup.py:152: UserW
arning: axes.hold is deprecated, will be removed in 3.0
  warnings.warn("axes.hold is deprecated, will be removed in 3.0")
```



5. Construct a ladder graph on 20 vertices. Also construct a spanning tree of this graph.

In [51]:

```
lg = nx.ladder_graph(20)
nx.draw(lg)
plt.show()
```

```
C:\Users\Jeevan\Anaconda3\lib\site-packages\networkx\drawing\nx_pylab.py:12
6: MatplotlibDeprecationWarning: pyplot.hold is deprecated.
    Future behavior will be consistent with the long-time default:
    plot commands add elements without first clearing the
    Axes and/or Figure.
  b = plt.ishold()
C:\Users\Jeevan\Anaconda3\lib\site-packages\networkx\drawing\nx_pylab.py:13
8: MatplotlibDeprecationWarning: pyplot.hold is deprecated.
    Future behavior will be consistent with the long-time default:
    plot commands add elements without first clearing the
    Axes and/or Figure.
  plt.hold(b)
C:\Users\Jeevan\Anaconda3\lib\site-packages\matplotlib\__init__.py:917: User
Warning: axes.hold is deprecated. Please remove it from your matplotlibrc an
d/or style files.
  warnings.warn(self.msg_depr_set % key)
C:\Users\Jeevan\Anaconda3\lib\site-packages\matplotlib\rcsetup.py:152: UserW
arning: axes.hold is deprecated, will be removed in 3.0
  warnings.warn("axes.hold is deprecated, will be removed in 3.0")
```