Complex Network

Quiz 2

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Code

```
#1. Make a program of counting the number of triangles in "karate club
   network". Show the code and its results.
print("#1.")
print("There are %d triangles in karate club network."
   %(sum(nx.triangles(G).values())//3))
```

```
#2. Compute the maximum number of triangles in a graph of 9 nodes.
print("#2.")
def factorial(n):
  if n == 0:
    return 1
  else:
    return n * factorial(n-1)

def comb(n, m):
  return n * (n-1) * (n-2)//(factorial(m))

print("The maximum number of triangle in a graph of 9 nodes is %d."
   %(comb(9,3)))
```

```
#3. Draw a graph of 9 nodes and 12 edges that contains no triangles.
print("#3.")
G9 = nx.Graph()
G9.add_nodes_from(range(1,9))
G9.add_edges_from([(1,2),(1,3),(1,5),(1,4),(1,6),(1,7),(1,8),(1,9)])
nx.draw_spring(G9, node_size=400, node_color='red', with_labels=True,
   font_weight='bold')
print("There are %d triangles in this 9-node network."
   %(sum(nx.triangles(G9).values())//3))

G12 = nx.Graph()
G12.add_nodes_from(range(1,12))
G12.add_edges_from([(1,7),(1,8),(1,9),(1,10),(1,11),(1,12),\
                    (2,7),(2,8),(2,9),(2,10),(2,11),(2,12),\
                    (3,7),(3,8),(3,9),(3,10),(3,11),(3,12),\
                    (4,7),(4,8),(4,9),(4,10),(4,11),(4,12),\
                    (5,7),(5,8),(5,9),(5,10),(5,11),(5,12),\
                    (6,7),(6,8),(6,9),(6,10),(6,11),(6,12)])
nx.draw_spring(G12, node_size=400, node_color='red', with_labels=True,
   font_weight='bold')
print("There are %d triangles in this 12-node network."
   %(sum(nx.triangles(G12).values())//3))
```

Results

```
#1.
There are 45 triangles in karate club network.
#2.
The maximum number of triangle in a graph of 9 nodes is 84.
#3.
There are 0 triangles in this 9-node network.
There are 0 triangles in this 12-node network.
```

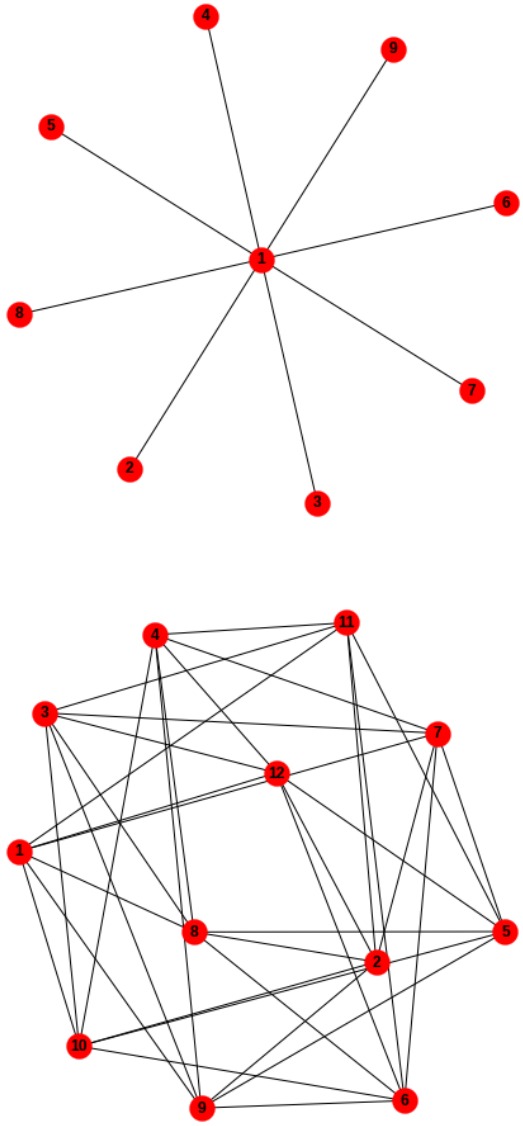

Figure 1: The output of each question. The upper figure is the graph of network with 9 nodes and 0 triangle. The lower one is the graph of network with 12 nodes and 0 triangle.