Social Network Analysis
Tutorial 2 (week 2)
Odd- 2020

NetworkX is a Python language software package for the creation, manipulation, and study of the structure, dynamics, and function of complex networks . NetworkX is used by developers to process and perform functionalities on various social media applications. With NetworkX you can load and store networks in standard and nonstandard data formats, generate many types of random and classic networks, analyze network structure, build network models, design new network algorithms, draw networks, and much more. You need to install two Python packages using pip install, Packages are- networkx, Matplotlib.

Graph Creation
Networkx graph objects can be created in one of three ways:

- Graph generators – standard algorithms to create network topologies.
- Importing data from pre-existing (usually file) sources.
- Adding edges and nodes explicitly.

Networkx reference manual is placed in help folder for further study.

Questions:

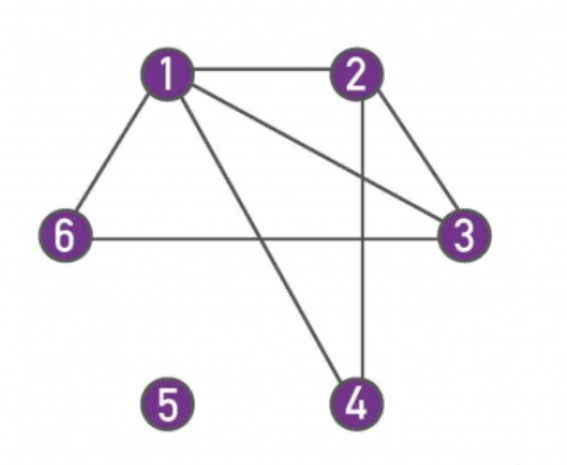
1. (Networkx) Generate a graph of Karate club dataset as below and do the following:

```
import matplotlib.pyplot as plt
import networkx as nx
G = nx.karate_club_graph()
```

   - Find Number of nodes and edges
   - Type of graph
   - Density
   - Clustering Coefficient
   - Degree distribution graph
   - Number of connected components
   - Average shortest path length
   - Visualize graph using Matplotlib

2. (Networkx) Generate a graph by reading edge list of any dataset (SNAP repository or Konect) and do same as above (1).

3. (Solve Manually) Consider the given undirected network, do the following:



a) Using Trajan's Algorithm find out the Bridge edges and articulation node in the Network.
b) Find out the neighborhood overlap between e and f.
c) Identify different components of the bowtie structure in the network?
d) What is the degree distribution of this network?
e) Determine the Local, average global, clustering coefficient of the network.
f) Calculate Average path length, diameter and eccentricity.