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Homework Assignment 1
CS544 Introduction to Network Science
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Instructions

Consider the following tutorials on creating different graphs using python and networkX. Copy the relevant portions of the code and add new ones for the problems given below. Do the problems in google colab. Create a pdf file with the codes and the outputs. Share the .ipynb files and the pdf file in teams.

1. Tutorial 1a and Tutorial 1b: Creating undirected, directed and multi-graphs.

2. Tutorial 2 Creating bipartite graphs

Please note that the tutorial may use a old python version and many of the functions may not be currently available. Search the web and replace with the corresponding available functions.

Problems

1. Create a k-regular undirected graph (each node has fixed degree k). Draw the graph for $k = 4$ and number of nodes $n = 15$ using draw() function and print the adjacency matrix.

2. Add node attributes like node ID and color. Show the graph attributes using the function G.nodes.data() function.

3. Create a directed graph of $n = 15$ nodes and random directed edges, where the probability of an edge from node i to j is 0.6. Draw the graph using draw() function.

4. Create an undirected bipartite graph with 10 nodes in 1st layer and 5 in another. Create random edges between nodes of 2 layers, where the probability of an edge appearing between node i and j is 0.5. Draw the graph using draw() function.

5. Create an one-mode projection on layer 1 and draw the graph using draw() function.