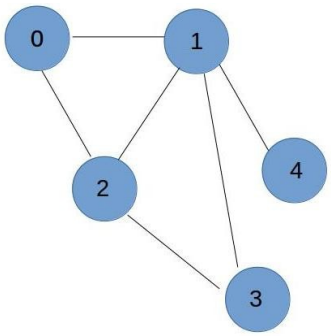
Lab9 Assignment – Graphs, BFS

Do these problems in order. Other than Problem 1, use the adjacency lists to store the input graph.

Problem 1: Graph Representation: Adjacency Matrix, Adjacency List

Write a program to store (and then print) the adjacency matrix and adjacency list representation of an undirected graph. Read in the graph from the user. A sample input/output of the program is shown for the graph below.



Input:

Enter the number of vertices: 5
Enter the edges:
0 1
0 2
1 2
1 3
1 4
2 3

Output:

The adjacency matrix is
0 1 1 0 0
1 0 1 1 1
1 1 0 1 0
0 1 1 0 0
0 1 0 0 0

The adjacency list is:
Vertex 0: 1, 2
Vertex 1: 0, 2, 3
Vertex 2: 0, 1, 3
Vertex 3: 1, 2
Vertex 4: 1

Problem 2: Breadth First Search

Write a program to implement BFS on a undirected graph. Read in a graph and a source vertex from the user. Print the vertices in the order in which they are visited, along with their distance from the source vertex.

Problem 3: Connected Components

Write a program to compute the connected components of an undirected graph. Read in a graph from the user. Print the vertices in each connected component of the graph.

Problem 4: Cycle Detection in Directed Graphs.

Write a program to input a directed graph from the user and check if it has a cycle or not.