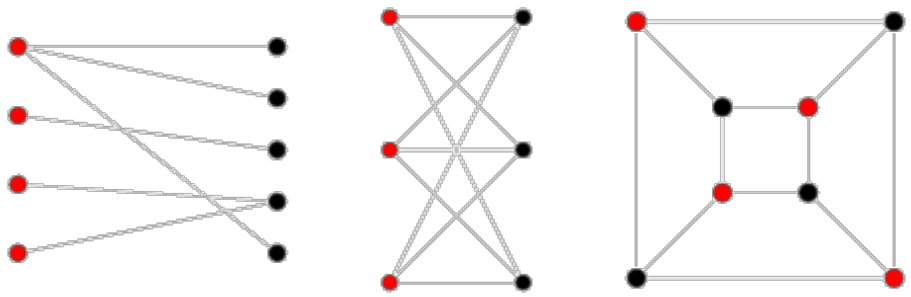
CO322 – Data Structures and Algorithms

Lab – Graphs I

Task 1

In graph theory, a bipartite graph is a graph in which the vertices can be divided into two disjoint sets. Every edge in the graph connects a vertex in one set to a vertex in the other set. Following are three examples of bipartite graphs.



Bipartite graphs where red vertices belong to one set and black vertices belong to another set

Using breadth-first search (BFS), design an algorithm to find out whether a graph given as an adjacency matrix is a bipartite graph. Code your algorithm in Java. Demonstrate it using a sample bipartite graph and a sample non-bipartite graph.

Task 2

Write Java code to get the transitive closure of a graph using depth-first search (DFS). The graph is represented as an adjacency list. The number of vertices of the graph is to be passed into its constructor.