Reading List for Exam 3 (in-class, OPEN notes)

All questions from Module 9 - Graphs

Part I - To be tested on Wednesday, April 24th: 1 PM to 1.50 PM

1) Given a bipartite graph, run the Breadth First Search (BFS) algorithm on the graph: indicate the level numbers of the vertices and identify the tree edges and cross edges, using all of which determine the two partitions of the graph.

2) Given a graph, run the Depth First Search (DFS) algorithm on a given graph to identify the articulation points and bridge edges. Merely guessing and writing an answer will get you only ZERO points.

3) Run the Depth First Search (DFS) algorithm on a given directed graph.
(a) Identify the different types of edges as part of DFS.
(b) Determine the push and pop order of the vertices.
(c) Determine the strongly connected component(s) of the graph
(d) Determine the weakly connected component(s) of the graph

Part II - To be tested on Friday, April 26th: 1 PM to 1.50 PM

4) Given an undirected graph, run the Depth First Search (DFS) algorithm.
(a) Draw the DFS tree with tree edges and back edges as well as show the push and pop orders of the vertices.
(b) Use the results of (a) to assign directions to the edges such that the resulting directed graph has all the vertices in one strongly connected component.
(c) Use the results of (a) to assign directions to the edges such that the resulting directed graph is a directed acyclic graph (DAG).

5) Run the Depth First Search algorithm on a given directed acyclic graph (DAG) and determine a topological sort of the vertices.

6) Given an undirected graph.
(a) Determine the degree values of the vertices and the probability of observing a vertex with a certain degree.
(b) Using (a), determine the average degree of the vertices and the number of edges in the graph.
(c) Assign directions to the edges such that the resulting directed graph is a directed acyclic graph with a given topological sort order.
(d) Without running DFS, what can you say about the strongly connected components of the directed graph obtained in (c)?