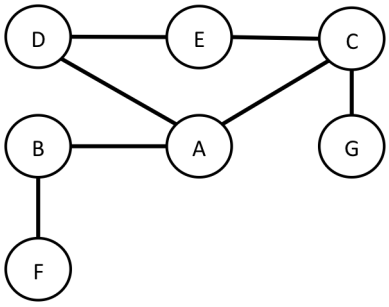
Math 382

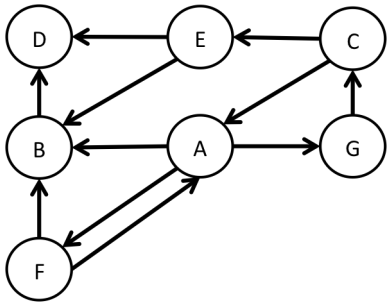
Homework 8

Due Friday, April 8

1. Below are two graphs. For each one, complete the following parts.



Graph #1



Graph #2

   (a) Write the adjacency list representation of the graph.

   (b) Write the adjacency matrix represetation of the graph.

   (c) List in order the nodes that would be visited in a breadth first search that used vertx A as the source. Assume that when a vertex's neighbors are examined that they are examined in alphabetical order.

   (d) Draw the tree created by breadth first search with A as the source.

   (e) Draw the tree created with depth first search. As before, assume that anytime the algorithm does not specify the order in which to examine nodes, the possible candidates are examined in alphabetical order. On the tree, label each node with its discover and finishing times.

2. *Briefly* describe how BFS and DFS algorithms would have to be modified from those given in class if the input was given as an adjacency matrix instead of the adjacency list representation we assumed. What would the running time of each algorithm now be?

3. EXTRA CREDIT: Say you took the adjacensy matrix M for a given graph and treated it as an actual matrix (rather than just a two-dimensional array). You could then carry out matrix operations. In particular, you could raise M to some power. Give a natural-language interpretation of what M^i represents. Prove your answer. (For somewhat less extra credit, just prove it for the case where $i = 2$.)