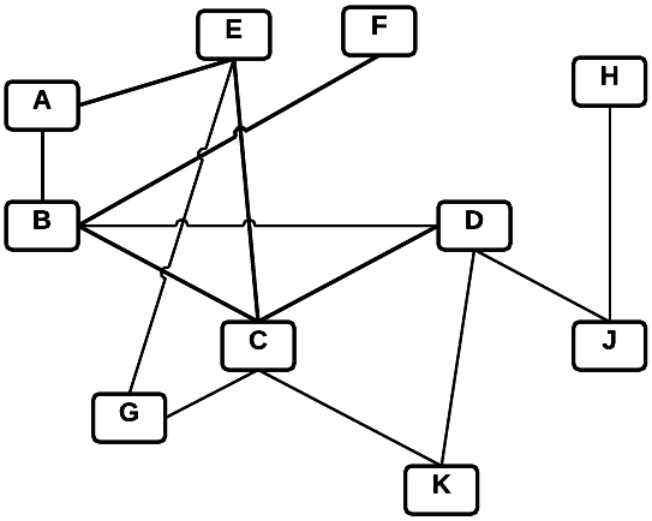
CSCI 3202 Introduction to Artificial Intelligence
Instructor: Hoenigman
Assignment 2
Due Sept 11, by 4pm

Answer each of the following problems on paper. Due at the beginning of class on Friday.



Problems:

1. For the graph shown here, list the order that the nodes are visited in a breadth-first traversal of the entire graph, starting at A. Assume child nodes evaluated in alphabetical order.
2. Using the same graph, list the order that the nodes are visited in a depth-first traversal of the entire graph, starting at A. Assume child nodes evaluated in alphabetical order.
3. In an unweighted graph, can DFS find the optimal shortest path without evaluating the entire search tree? Explain your answer with an example.
4. Consider a state space where the start state is the number 1 and the successor function for state n returns two states, 2n and 2n + 1.
    a. Draw the portion of the state space for states 1 to 15
    b. For a goal state of 11, list the order in which nodes will be visited for BFS, DLS with limit 3, and iterative deepening search. (Use the iterative deepening algorithm that restarts at the root on each iteration.)
5. The missionaries and cannibals problem is a famous AI problem that goes something like this: Three missionaries and three cannibals are on one side of a river, along with a boat that can hold one or two people. Find a way to get everyone to the other side, without ever leaving a group of missionaries in one place outnumbered by the cannibals in that place.

    a. What is the state space for this problem? ie, what variables are in a state and what is the size of the state space?
    b. What is the successor function to generate new states from the current state? Write a pseudocode algorithm. It's acceptable to have your algorithm return a list of valid states.
    c. Draw the first three levels of the search tree. The first level is the initial state.
6. Show an example where DFS generates a sub-optimal result in an unweighted graph.