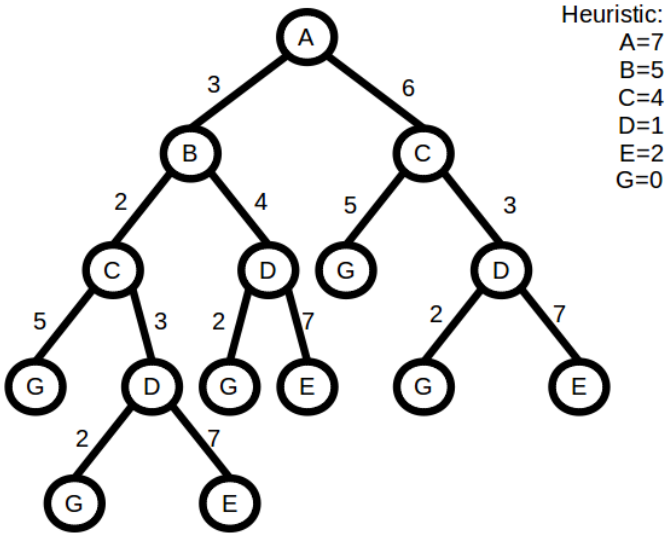
CSci 4511
Midterm 1

Name: _____

Student ID: _____

Instructions: The time limit is 75 minutes. Please write your answers in the space below. The exam is open book and notes. You may use electronic devices to ONLY look at either an e-book version or electronic notes. You may not use the internet, program/run code or any other outside resources. For all questions you must **show work**.

Problem (1) [20 points]
Run iterative deepening A* on the following tree, where "G" is the goal state. For each iteration/limit please clearly specify the order you search nodes along with the current limit.



Problem (2) [20 points]
Suppose you have to grade a homework assignment with 5 problems for a class of 30 students. Answer the following questions about this problem.
(1) Define clearly what a state is and the possible actions.
(2) Classify this problem based on these six categorizations: fully/partially observable, singe/mult-agent, deterministic/stochastic, episodic/sequential, static/dynamic, and discrete/continuous.
(3) Would a incremental or complete-state approach be more applicable for this problem? Justify.

Problem (3) [20 points]
Create a tree that is structured so if you ran some algorithms on it: (1) breadth first search would be faster than depth first search and (2) uniform cost search would be faster than breadth first search. These properties should be true regardless of how ties are broken.

Problem (4) [15 points]
Explain the behaviour of A* if the heuristic is the optimal path cost for every node. Also write a few sentences proving why this is the case.

Problem (5) [25 points]
Answer the following:

- Explain what general property makes bi-directional search not perform well. Give an example of such a problem with this property (and explain it a bit).
- Give an example of a problem where breadth first search finds an optimal answer. Also give an example where breadth first search will not (generally) find the optimal answer. Explain why the algorithm performs as such in each case.
- Assume you used a search to solve a problem (initial to goal). Is this solution rational? Explain why or why not. (Write down any assumptions you are making.)