CSCE 625-700 Homework #1

Upload scanned handwritten solution or typed pdf file to Canvas.

Uninformed Search

Total: 100 points

* Note: In the questions below, the node list should have to form `[a, b, c, d, ... ]` where ``a'' is the first element of this list that gets taken out for inspection, and the rest are ordered from left to right. That is, `Get-First-Node([a, b, c, d ...]) = a`.

* Note: "visit" means the act of taking a node out of the node list and checking if it is the goal.

* Note: Depth is 0 at the root, and increases by 1 as you follow the edge downward. That is, depth equals the number of operator you executed to reach the current level.

* Note: When the goal is found, no further nodes are expanded.

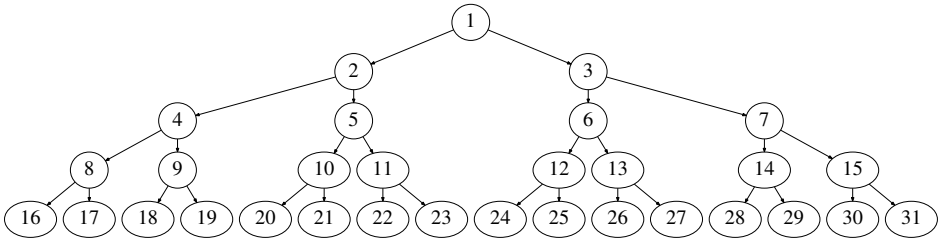

Figure 1: **Search Trees.**

Consider the search tree in Fig. 1. Assume that the exploration of the children of a particular node proceeds from the left to the right for all search methods in this section.

Question 1 (20 pts): Consider depth first search. When the goal is (18) and the node is reached (taken out of node list for goal check),

(1) What are the nodes that remain in the node list? (list them in the correct order).

(2) Which nodes have been visited until then, in what order?

Question 2 (20 pts): Consider breadth first search. When the goal is (11) and the node is reached (taken out of node list for goal check),

(1) What are the nodes that remain in the node list? (list them in the correct order). **Note:** At this point, the search is done, and (11) is not expanded any further.

(2) Which nodes have been visited until then, in what order?

Question 3 (20 pts): Why is the space complexity of BFS $O(b^{d+1})$, not $O(b^d)$, where b is the branching factor and d is the goal depth?

Question 4 (20 pts): Can depth limited search become incomplete in the case of the finite search tree above? If so, give an example (use Figure 1). If not, explain why not (use Figure 1).

Question 5 (20 pts): Consider iterative deepening search. When the goal is (17), how many nodes are visited in total? The count should include all the iterations over the increasing depth limit. Include the visit to (17) in the count.