CSC 361   **MIDTERM 1**   **2nd Semester 1428/1429**
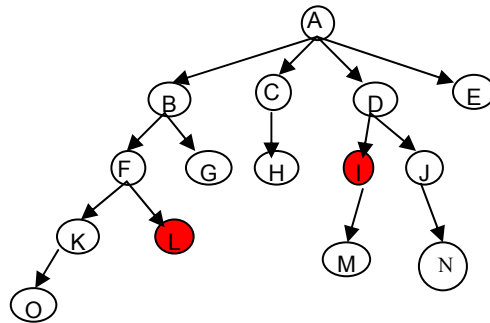

Question 1.

1. Prove that the time and space complexity of BFS is $O(b^d)$.
2. Prove that the time and space complexity of UCS is $O(b^d)$.
3. Knowing that DFS has a time complexity $O(b^m)$, prove that IDS has a time complexity $O(b^d)$

Question 2: Given the following tree representing a state space and assuming that I and L are goal nodes, give the sequence in which nodes are visited using: - BFS, - DFS, - DLS (Depth Bound = 2), - IDS and - UCS. For UCS, assume that the cost of the application of any operator is equal to 1.

Question 3: Solve the following 8-puzzle problem using the following techniques:
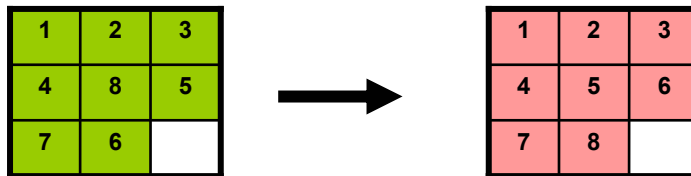
1. Greedy search (with systematic checking of repeated states) and Manhattan distance as heuristic (h2).

2. A* search (with systematic checking of repeated states) with the heuristic f(n)= g(n) + h1(n) where g(n) is the number of steps from the initial state and h1(n) is the number of misplaced tiles.

Question 4: Solve the following 8-puzzle problem using IDA* search (with systematic checking of repeated states) with the heuristic f(n)= g(n) + h1(n) where g(n) is the number of steps from the initial state and h1(n) is the number of misplaced tiles.