CA318 Exam

Question 1

1. The 8 puzzle can be represented by using a search graph where there is a starting set of numbers in a random order and a goal set in numerical order of 1 – 8 with a space value. For each move made to bring the start state to the goal there can be a decision represented as going from 1 symbol to the next in a binary search tree
   1. Iterative Deepening Depth First Search or IDDFS is a search algorithm performed upon graph and trees. It is a child of the Depth first search algorithm which expands on nodes from leftmost and gradually working to the right most node. Iterative deepening is applied to it so that the depth is defined to a certain number which then explores all the nodes from leftmost to rightmost before expanding further down the tree.
   2. It is preferred over breadth first search since it consumes less memory, time complexity is time-limited rather than space limited. Also if the goal is close to the root node then it will be found faster than using BFS.
   3. For BFS to be more beneficial tofinding a solution, it will never be trapped on a long depth of unwanted nodes, if there multiple solutions then it will find them with minimal steps and it will always guarantee a route to the goal
2. Depth Graph:
   1. Closed List: { A, B, E}
   2. Open List: { C, D, F, K, L}
3. Breadth Graph:
   1. Closed List: { A, B, C, D, E}
   2. Open List: { F, G, H, I, J, K, L}

Question 2

1. Table for nodes

|  |  |
| --- | --- |
| **Current Node** | **Open List (Node Dist + Heuristic)** |
| *S* | A(7), B(6) |
| *A* | C(7) |
| *B* | C(8), D(7) |
| *C* | E(7), F(3) |
| *D* | F(5) |
| *E* | G(4) |
| *F* | G(1) |
| *G* | GOAL |

1. B
   1. Nodes not examined: { B, E}
   2. The most promising node or by default, the leftmost node would be expanded from the Start node. Then BFS would expand each node from the root recursively: {S, B, A, D, C, F, E, G}
2. The algorithm would be inclined to move from D to F but this is not the fastest route possible
3. Heuristic functions
   1. H1 = 0 is an admissible heuristic since it adds no value to the function of (edge distance + heuristic). It is essentially useless to an algorithm as it will cause more computation while having absolutely no effect on the outcome.
   2. H2 = 10 provides a heuristic for some algorithm so it can effect the outcome of a path to the goal