Kenneth Eversole
CPTS440
HW3

1. Consider the following initial and goal states for the 8-puzzle problem same as Homework 1). In the search algorithms below, when iterating over possible actions(i.e., moving the blank tile), always consider the actions in the order: Left, Right, Up, Down. Also, be sure to use the search algorithms as defined the lecture notes.

1	2	3
4		6
7	5	8

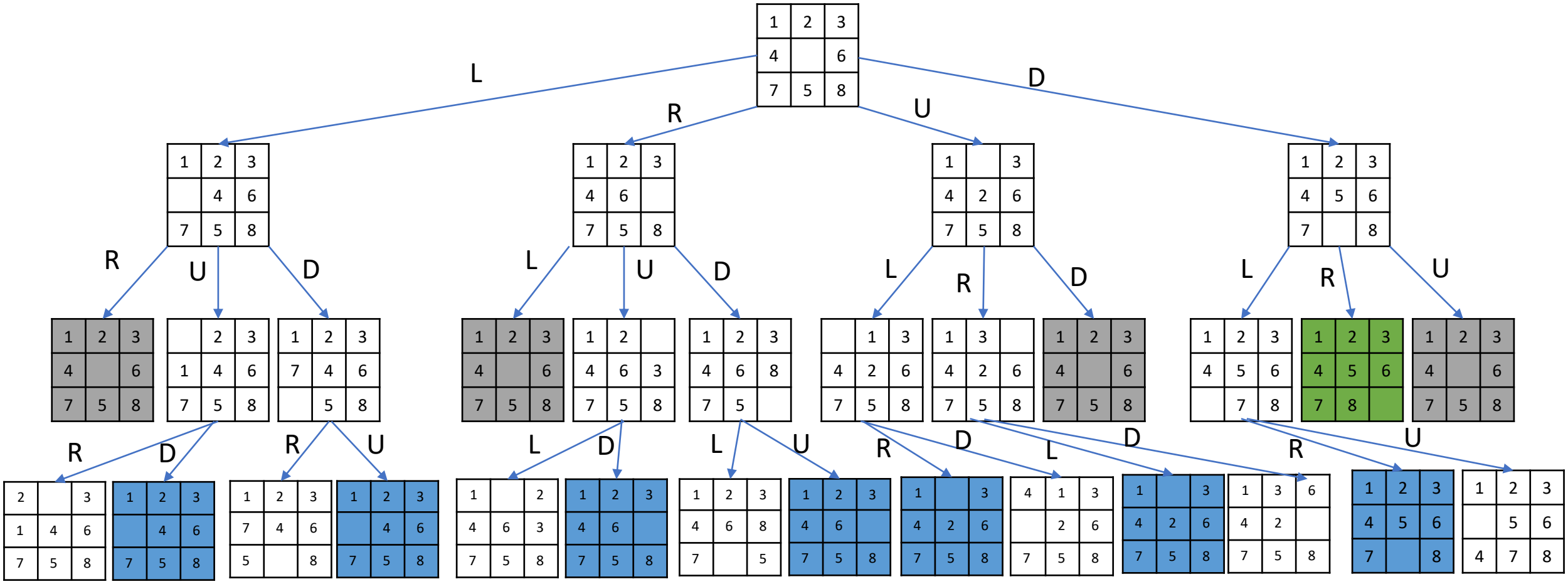
Initial

1	2	3
4	5	6
7	8	8

Goal

1.A) Draw the search tree showing all nodes generated by the Breadth-First Search algorithm to solve this problem

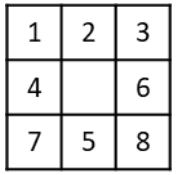
KEY:
Gray = Initial state
Blue = State is equal to a parent or grand parent state
Green = Goal State



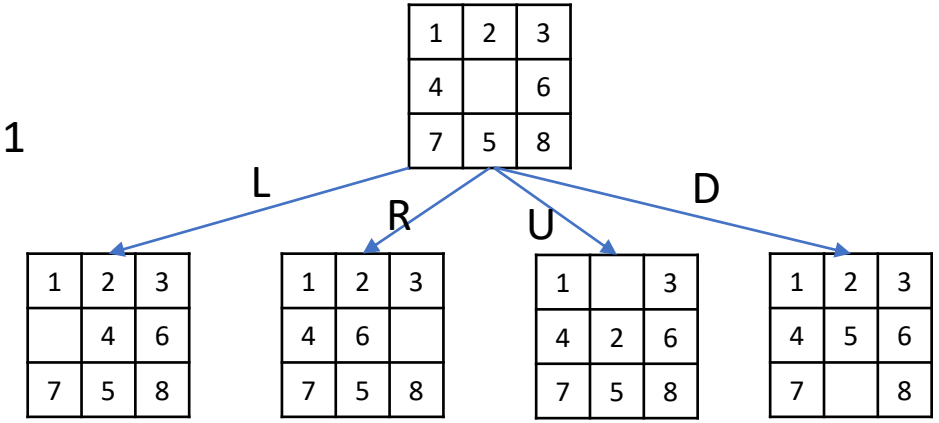
1.B) Draw the search trees for each iteration of the Iterative-Deepening Search algorithm to solve this problem

KEY:
Green = Goal State

Depth 0



Depth 1



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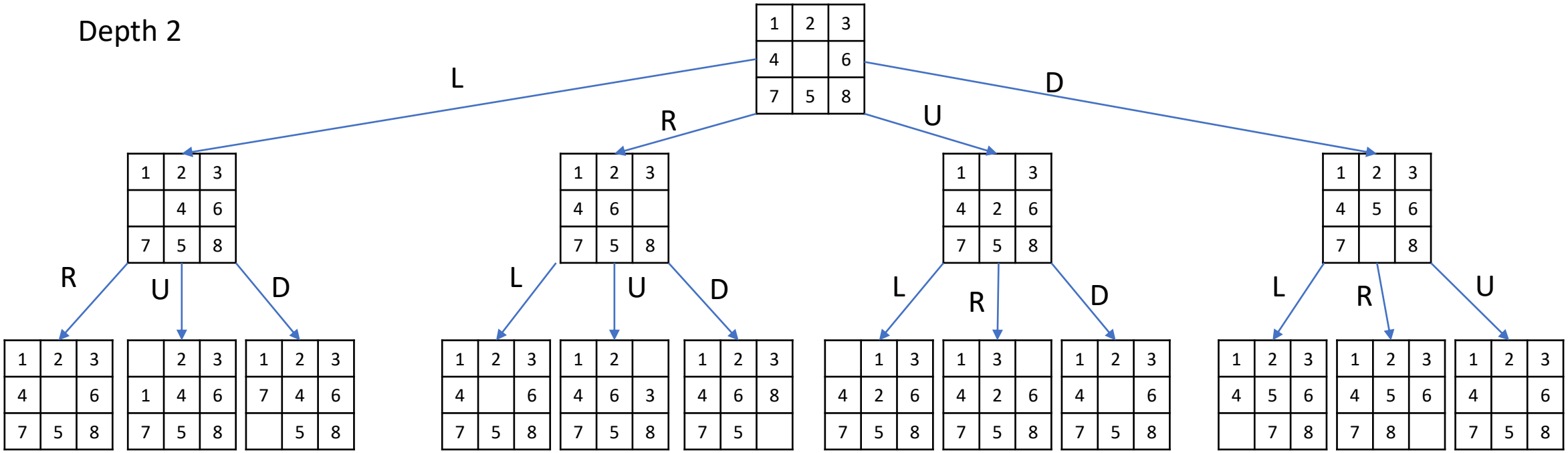
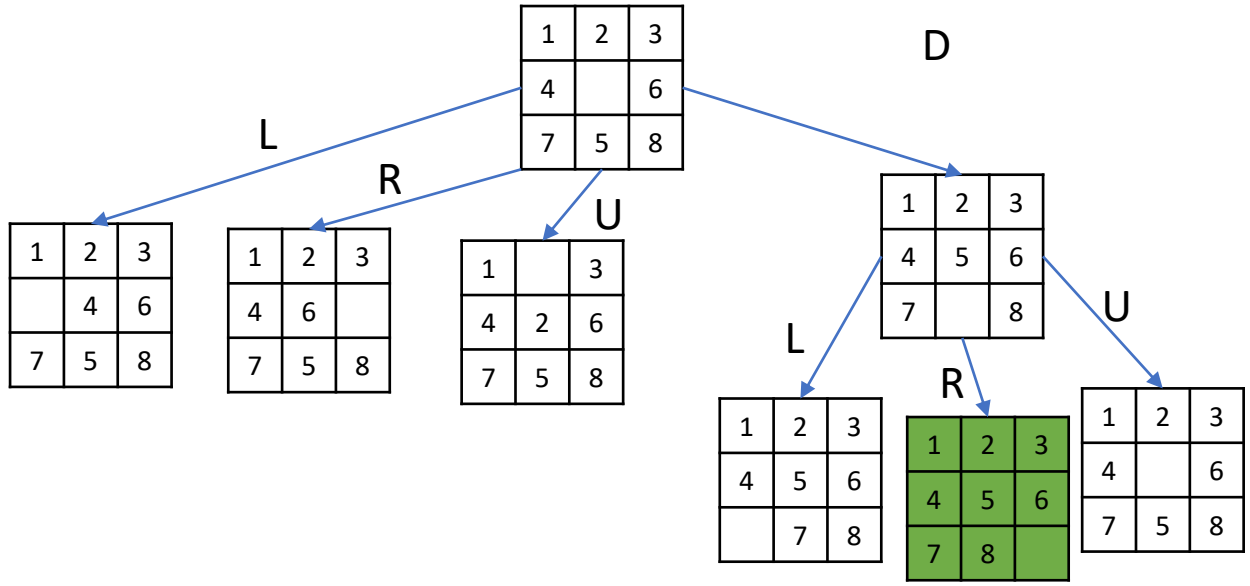
Depth 2

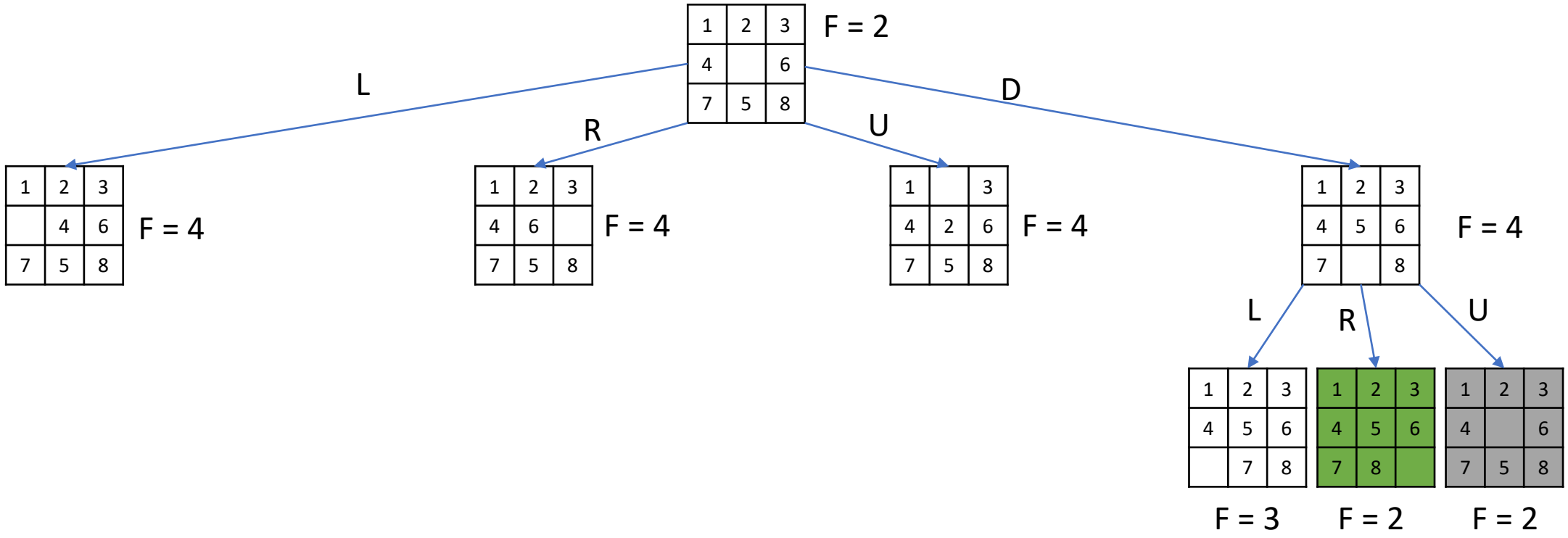


Depth 3



1.C) Draw the search tree generated by the A* search algorithm to solve this problem using the city-block distance for the heuristic h. The city-block distance for an 8-puzzle state is the sum of the city-block distances of each tile in the puzzle (excluding the blank tile). Next to every node, show the values of f, g and h. If two nodes have the same f value, then prefer nodes farther to the right in the search tree.

KEY:
Green = Goal State
Gray = State = base state
F = G(path distance) +
Cityblock



1.D) Draw the search tree generated by the Hill-Climbing search algorithm to solve this problem, where a state's Value = 1 / (h+ 1), where H is the heuristic from part (c).Next to every node, show its Value. Finally, indicate which node is returned. Be careful; note that the Hill-Climbing algorithm does not employ the goal test, but stops only after none of the generated neighbor nodes has a strictly better Value.

KEY:
Green = Return Node
Gray = State = base state
V = 1 /(Cityblock + 1)
ASSUMTION: If all states Vs equal then choose the farthest right