Cpts_540 hw3

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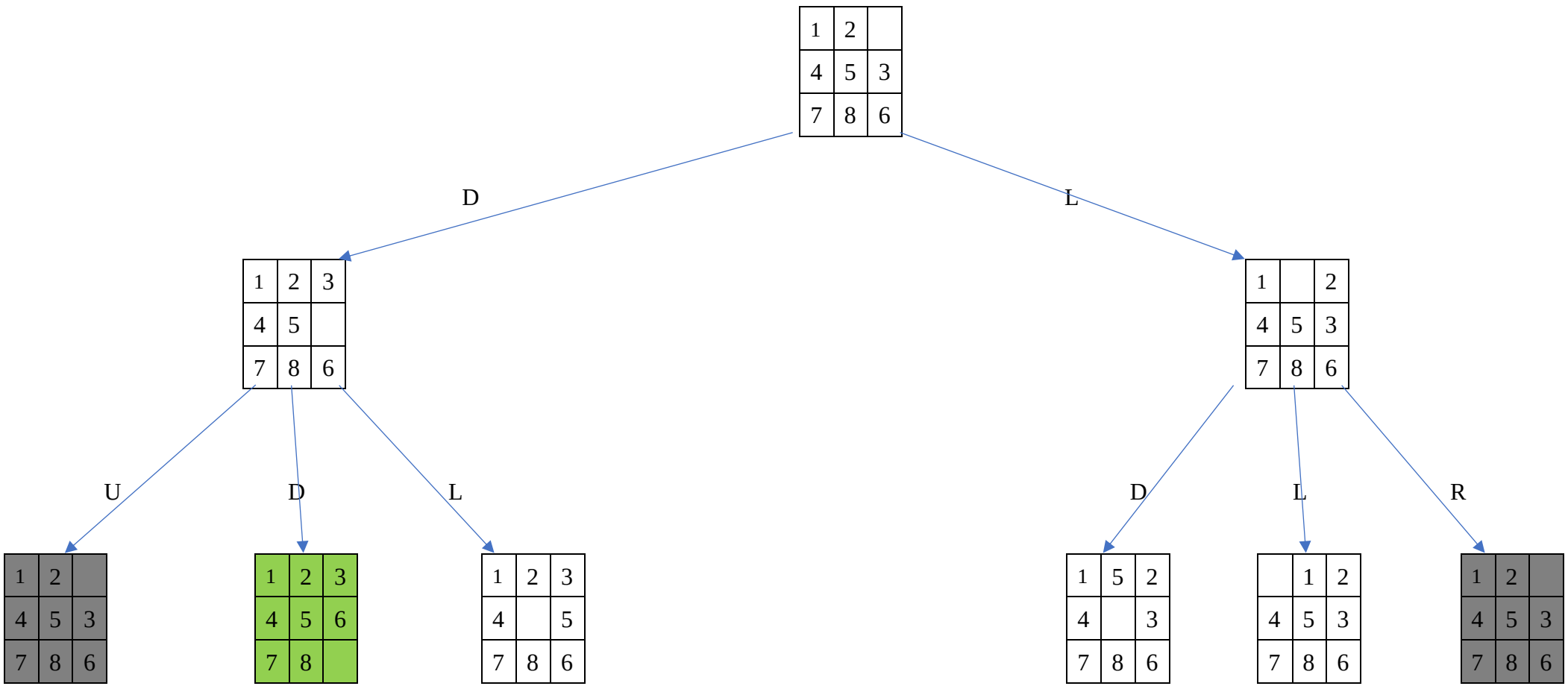
a. Draw the search tree showing all nodes generated by the Breadth-First Search algorithm to solve this problem.

Green is goal state, Gray is initial state.



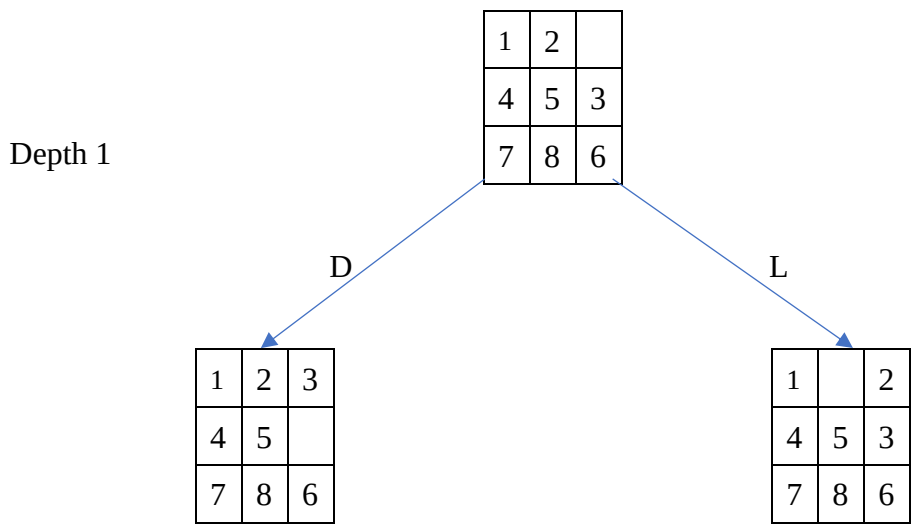
b. Draw the search trees showing all nodes generated for each iteration of the IterativeDeepening Search algorithm to solve this problem.

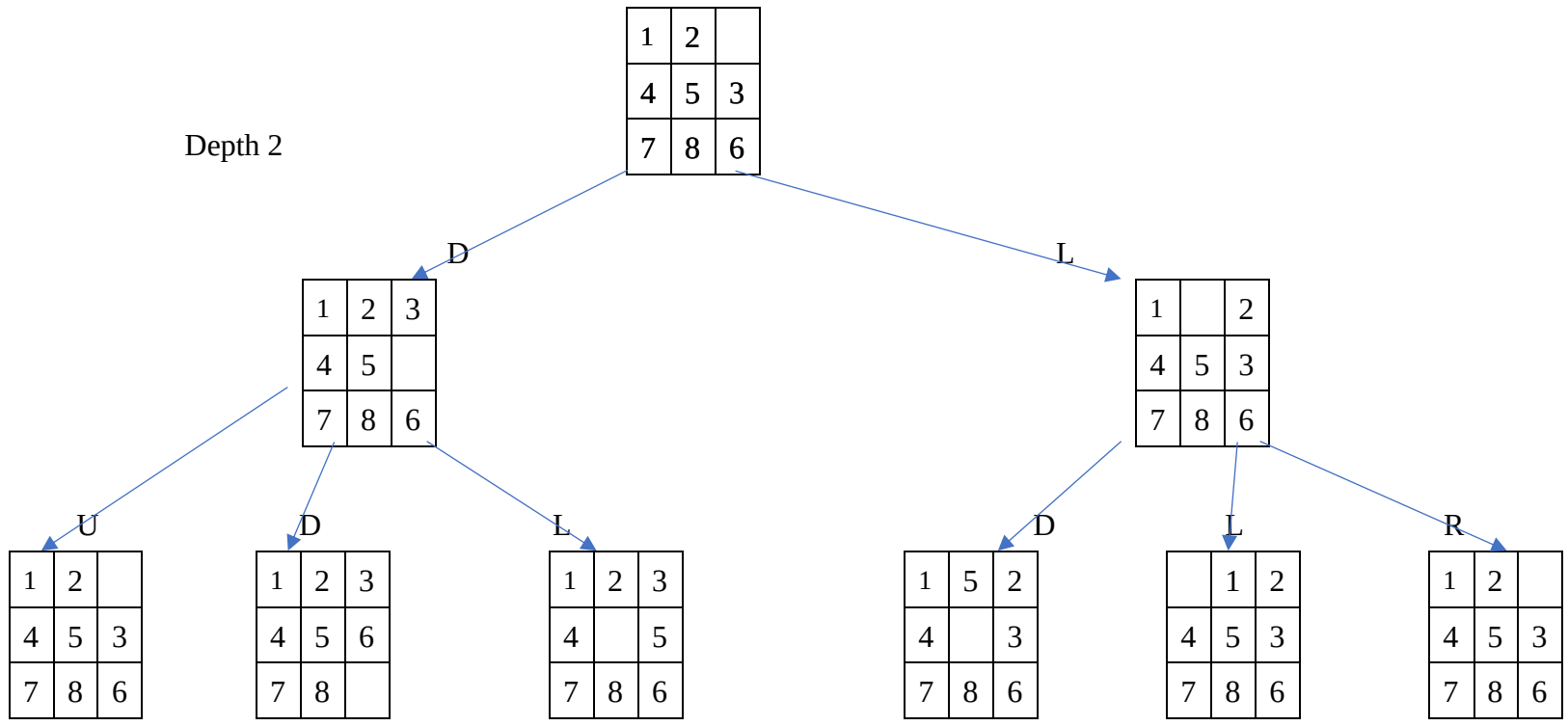
Green is goal state

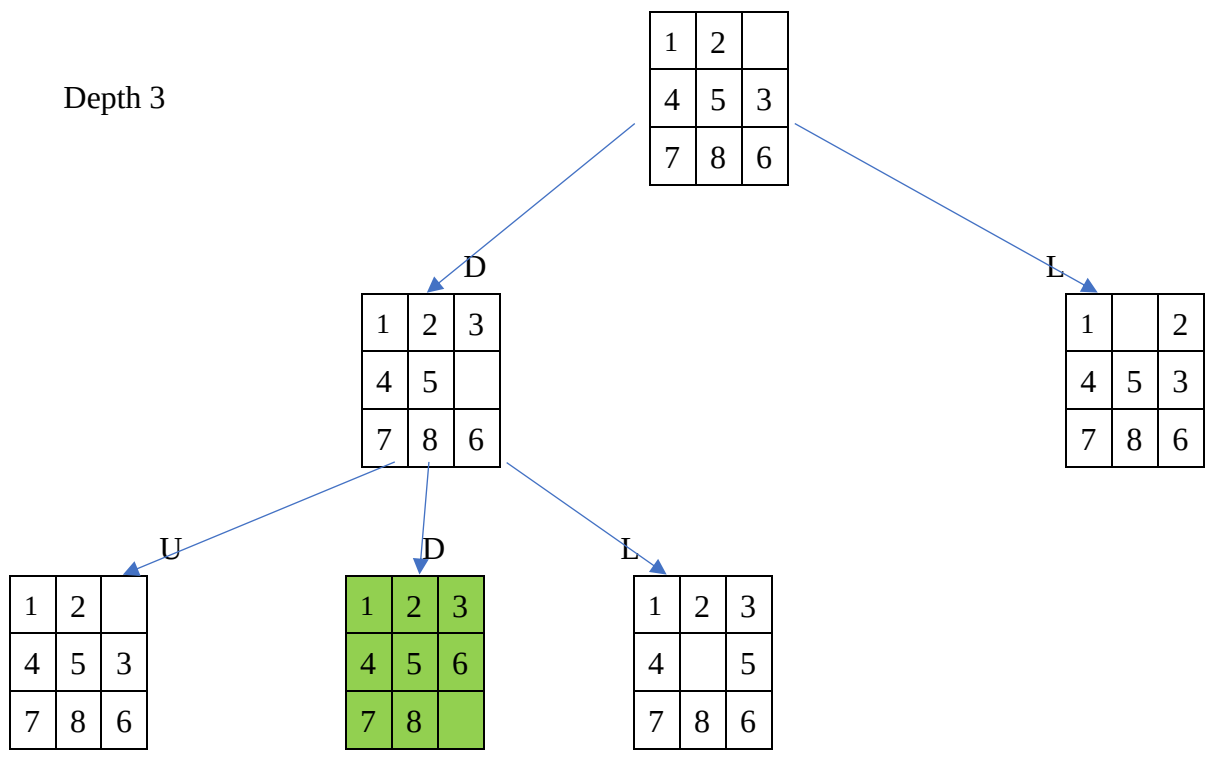
Depth 0

1	2	
4	5	3
7	8	6

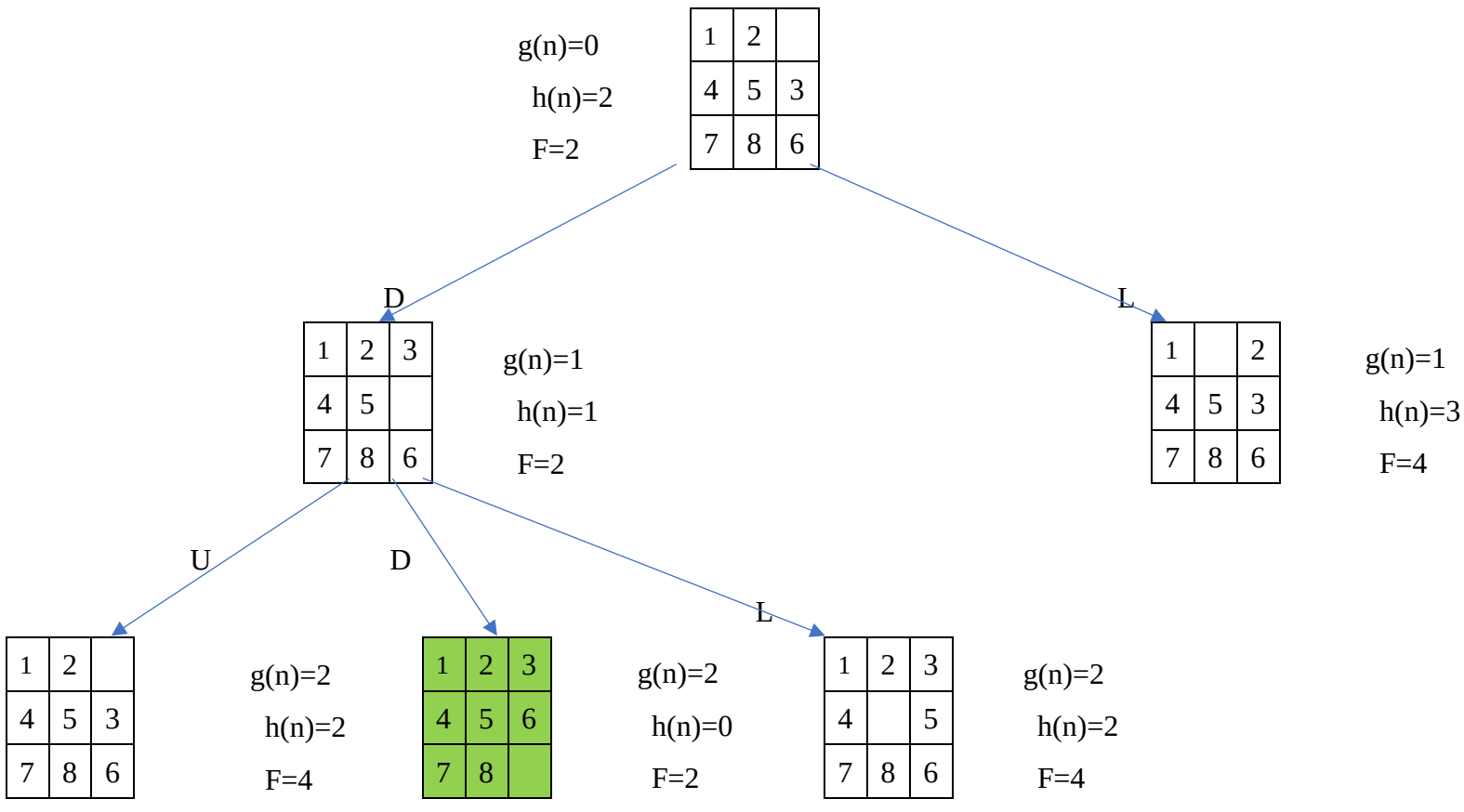
Depth 1







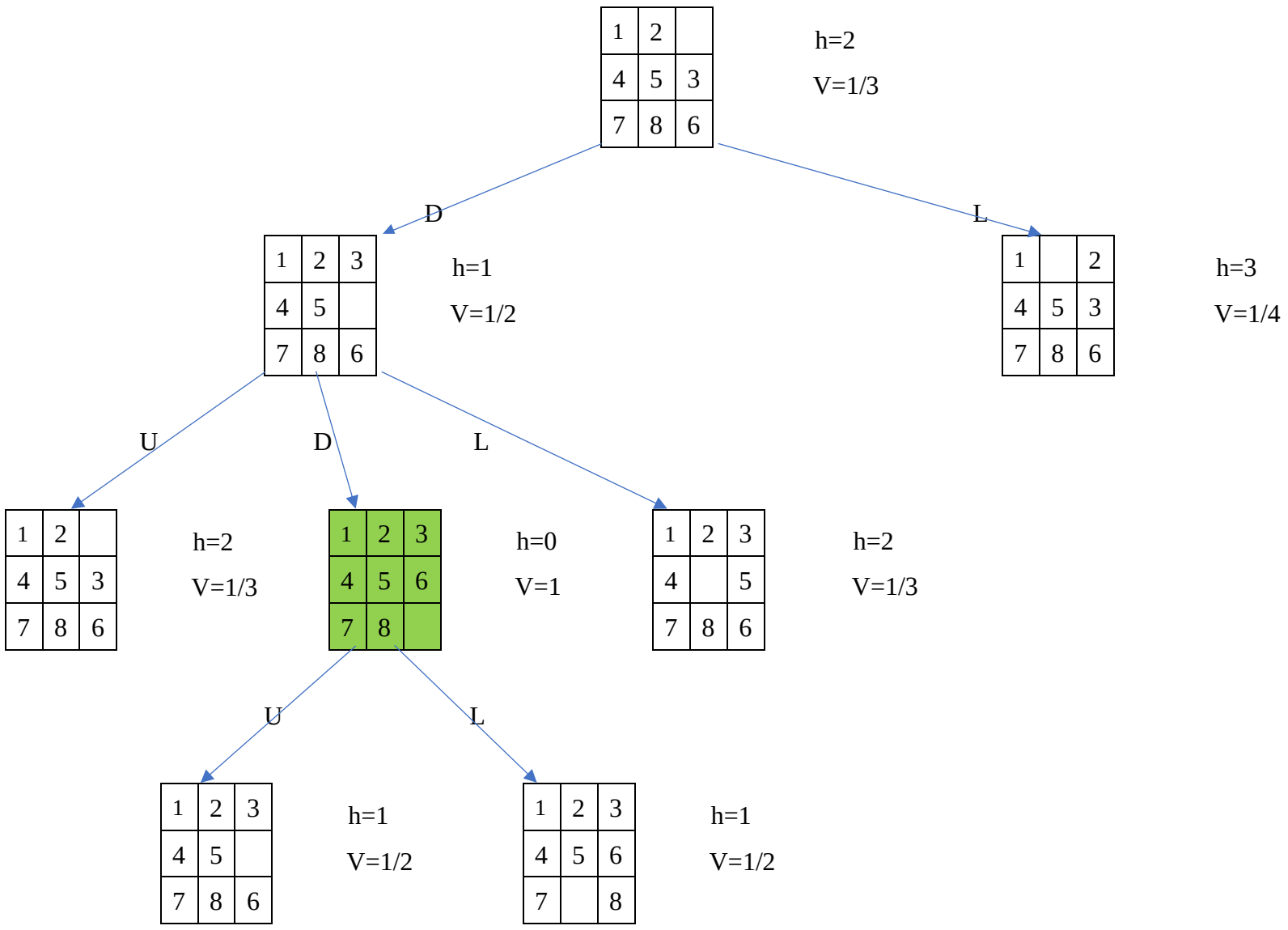
c. Draw the search tree generated by the A* search algorithm to solve this problem using the city-block distance for the heuristic h. The city-block distance for an 8-puzzle state is the sum of the city-block distances of each tile in the puzzle (excluding the blank tile). Next to every node, show the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



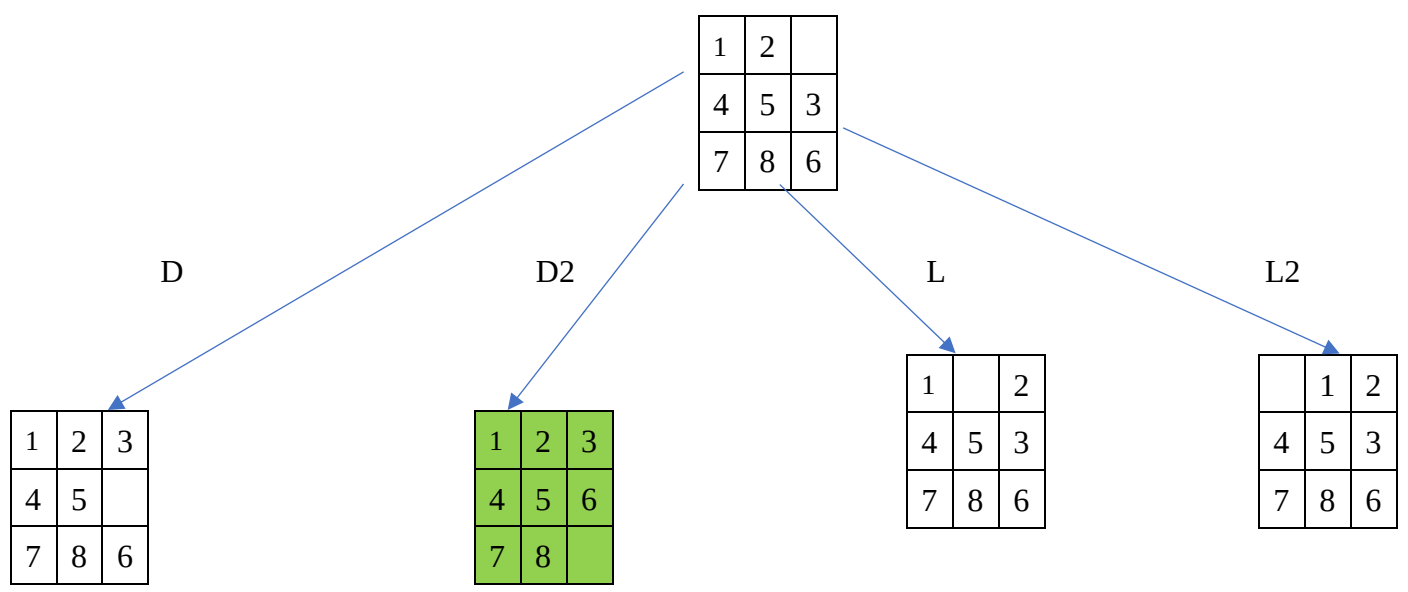
d. Consider a variant to the city-block heuristic that also adds in the city-block distance of the blank tile. Is this heuristic admissible for the 8-puzzle search problem? Justify your answer.

In my opinion, it is not heuristic admissible since an admissible heuristic never overestimates the cost to reach the goal. If we include the city-block distance of the blank tile, the sum of h(n) will become large which will make heuristic overestimate the cost to reach the goal.

e. 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.

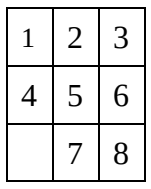


f. CPTS 540 Students Only: Draw the search tree showing all nodes generated by BreadthFirst Search to solve the above problem using the actions in order left-to-right (U, U2, D, D2, L, L2, R, R2), where the (U2, D2, L2, R2) actions can move two tiles at once



g. CPTS 540 Students Only: Is the city-block heuristic described in part (c) admissible for the search problem in part (f)? Justify your answer.

As the following condition:



The heuristic cost h(n)=2, the actual cost is 1 (R2). It is not heuristic admissible since an admissible heuristic never overestimates the cost to reach the goal.