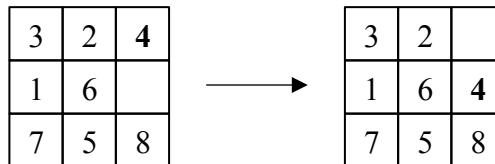


Problem 2: State-Space Search Trees [10 points]

The **8-puzzle** consists of eight numbered tiles on a 3 x 3 board. The object is to go from a starting state to a goal state by sliding tiles horizontally or vertically (**not diagonally**) using the empty space. For this problem, **assume** that if a state has been reached previously along the path back to the root in the search tree, you **cannot** go back to that state again (i.e., repeated state checking is done to avoid loop paths).



An example move in the 8-puzzle.

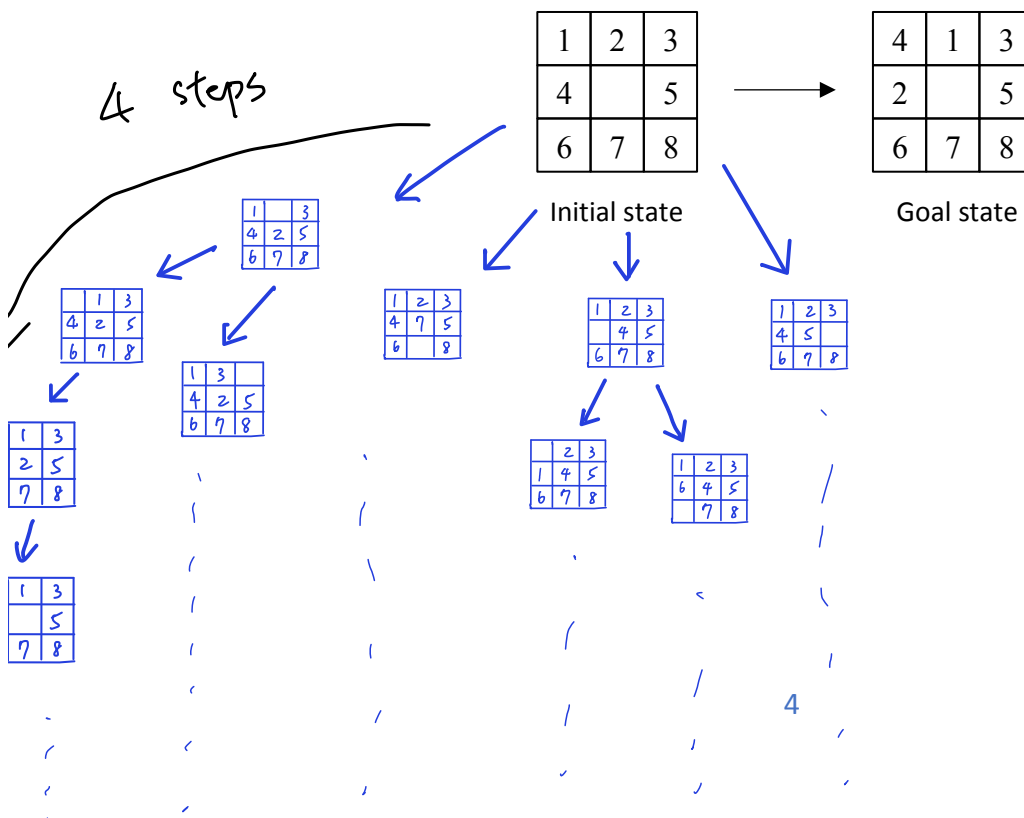
- (a) [3] From some state in the 8-puzzle, what can be the **minimum** number of possible moves (i.e., the minimum number of legal successors)?

1

- (b) [3] From some state in the 8-puzzle, what can be the **maximum** number of possible moves (i.e., the maximum number of legal successors)?

4

- (c) [4] What is the **minimum** number of moves needed to reach the goal state given below? Justify your answer by drawing a portion of the search tree that proves this.



each move cost 1

the smallest numbers of moves is 4 steps.

If we list down all the states.