Find the most cost-effective path to reach the final state from initial state using A* Algorithm

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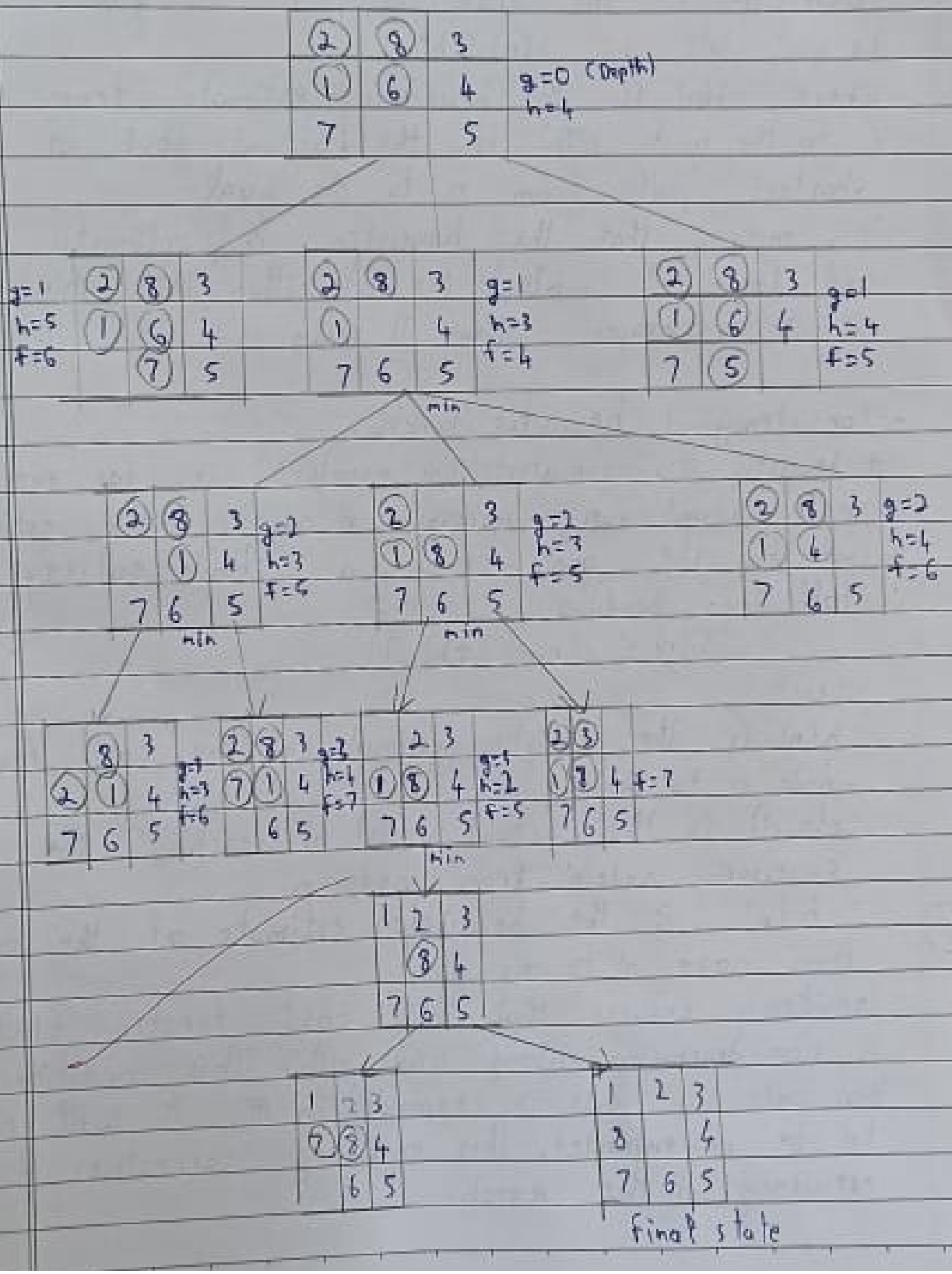
Initial state



Explain Admissibility and Consistency of Heuristic function in A* Algorithm

1. Admissibility of a Heuristic function

A heuristic function $h(n)$ is admissible if it never overestimates the true cost from a given state to the goal state i.e $h(n) \leq h^*(n)$

where $h(n)$ is the heuristic estimate from node n to the goal. $h^*(n)$ is the actual cost of the shortest path from n to the goal.

- This ensures that the heuristic is optimistic and does not mislead the algorithm into thinking a path is cheaper than it really is.

2. Consistency of heuristic function

A heuristic is consistent (or monotonic) if, for every node n and every successor n' of n, the estimated cost to the goal from n should satisfy the following condition:

$$h(n) \leq c(n,n') + h(n')$$

where

- $h(n)$ is the heuristic estimate of the cost from node n to the goal
- $c(n,n')$ is the actual cost of reaching the successor node n' from node n.
- $h(n')$ is the heuristic estimate of the cost from node n' to the goal.

- Consistency ensures that the cost function $f(n) = g(n) + h(n)$ is non-decreasing along any path. This condition guarantees that once a node is expanded in A*, it will not need to be re-expanded, thus ensuring correctness & efficiency of the search.