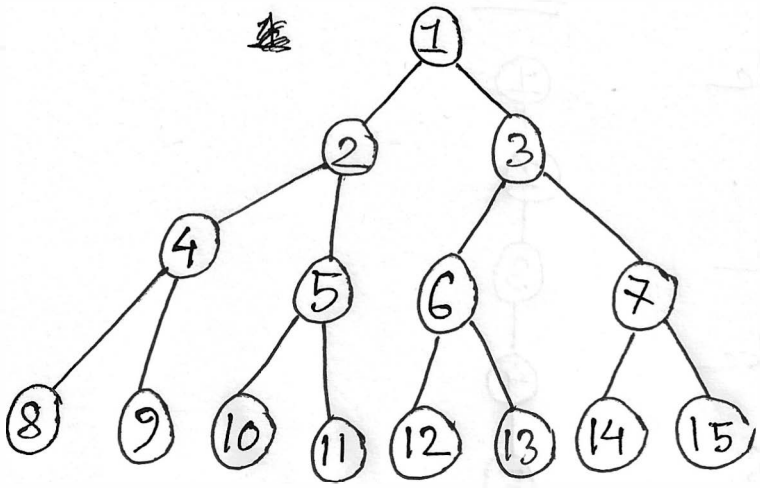
Ans. to Q No – (1)



When goal state = 10:

DFS is more suitable. Because, using DFS, we just have to visit 7 nodes to reach the goal state, whereas if we would use BFS, we would have to visit 10 nodes. The sequence of visiting nodes using DFS: 1 → 2 → 4 → 8 → 9 → 5 → 10

When goal state = 6:

Using DFS, we have to visit 10 nodes and using BFS, we have to visit 6 nodes to reach the goal. So, BFS is better in this case.

Sequence of visit: 1 → 2 → 3 → 4 → 5 → 6

Ans to Q No - 2

a

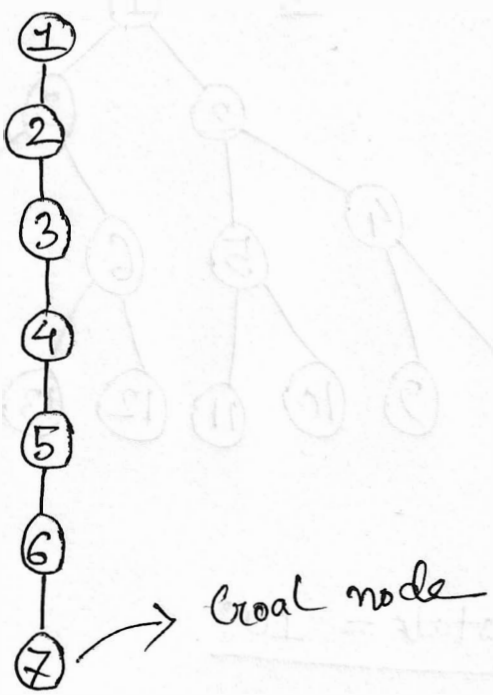
Here, the goal node is at level = 6.

Using IDS, time complexity will be

$O(n^2) = 6^2 = 36$

Using, DFS, time complexity will be

$O(d^b) = (6^1) = 6$.



b

"Completeness" means being able to find the goal state if it exists. So, it has no relevance to path costs. Moreover, BFS doesn't care about the path costs. It just keeps traversing one level at a time. So, if there is a solution, BFS is bound to reach it regardless of the cost and thus it is complete.

Ans. to Q. No - 3

Random state of the 8-puzzle problem:

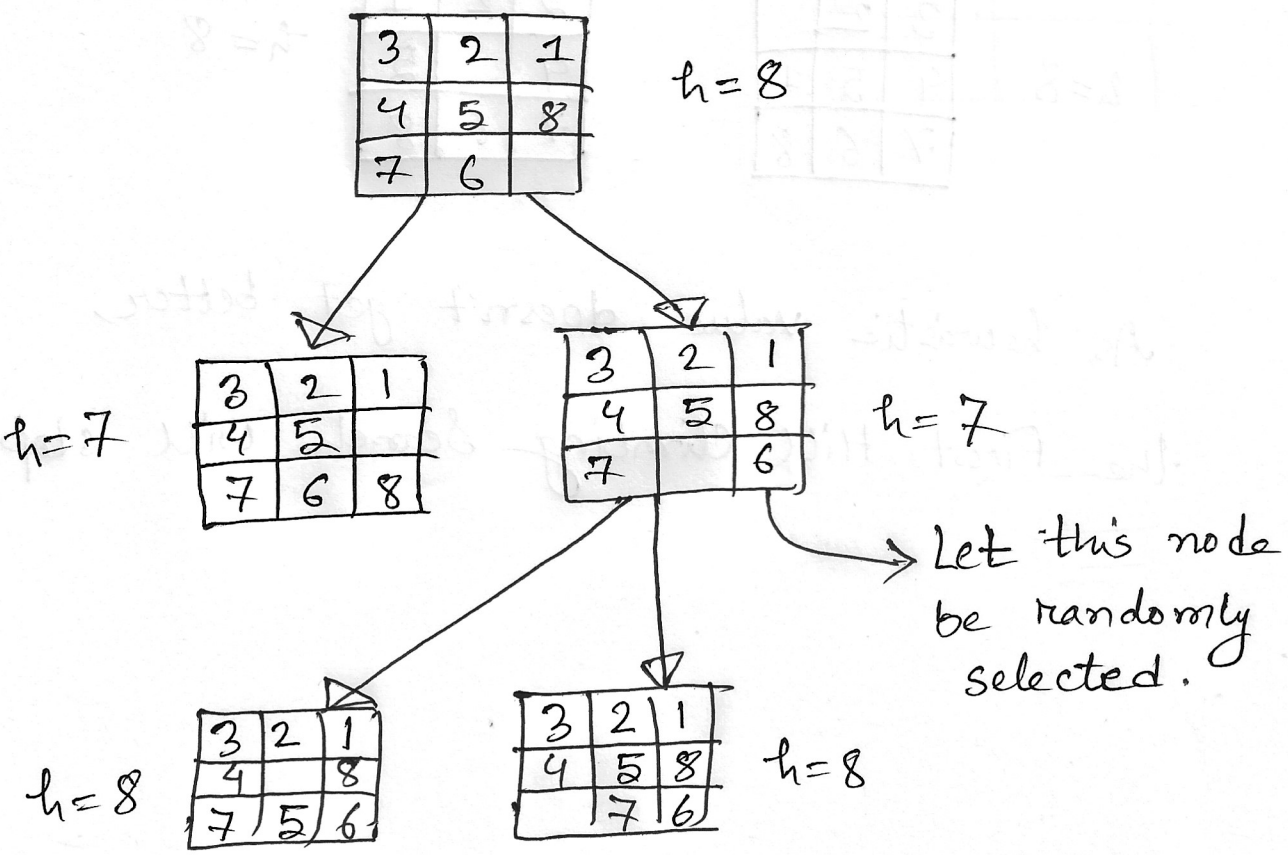
3	2	1
4	5	8
7	6	

The goal state:

1	2	3
4	5	6
7	8	

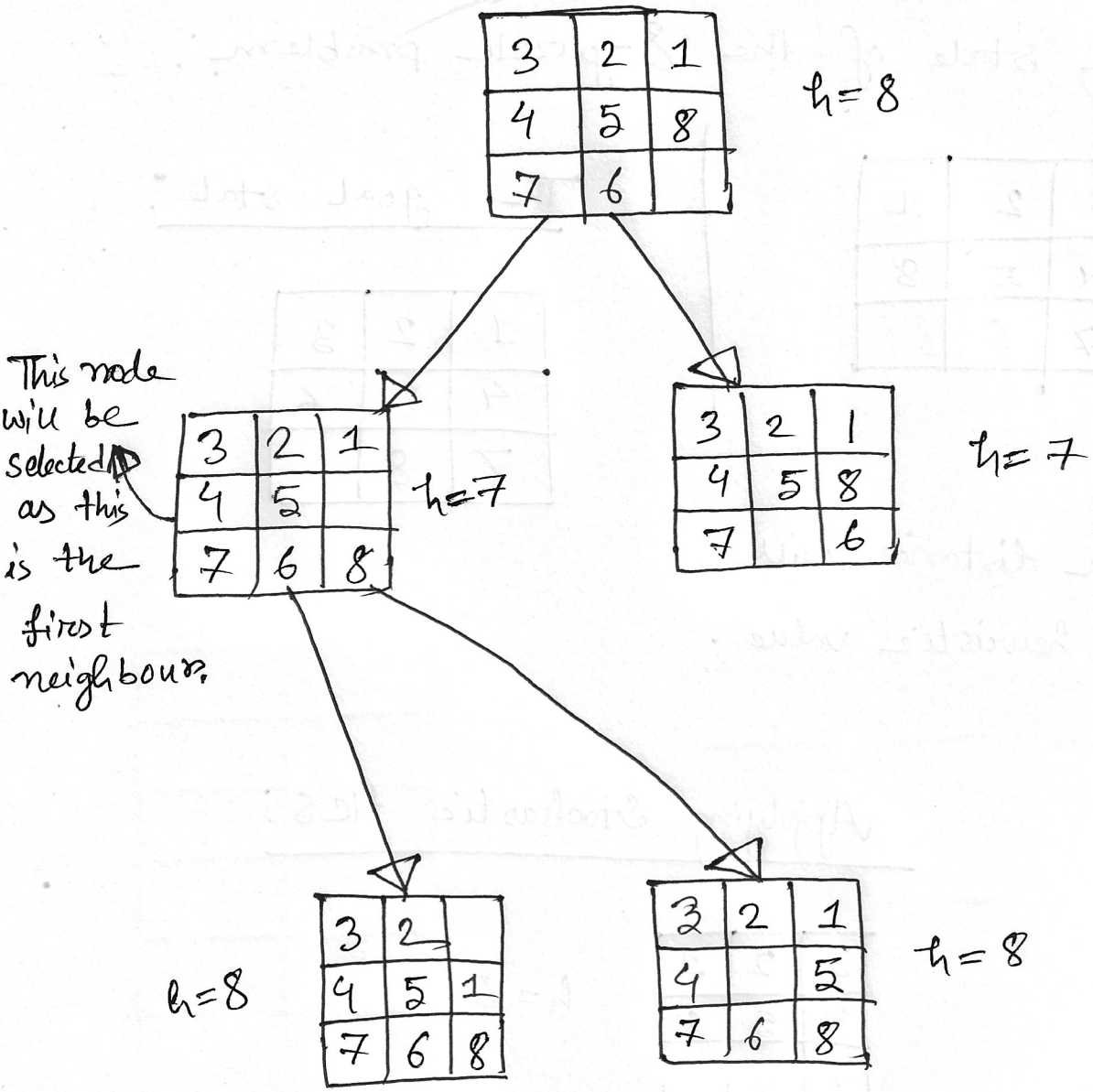
Manhattan distance will be the heuristic value.

Applying Stochastic HCS:



∵ heuristic value doesn't get better, HCS will stop.

Applying First HCS:



As, heuristic value doesn't get better, the First Hill Climbing Search will stop here.

Ans to Q No – 4

Though Uniform Cost Search and Breadth First Search are both uninformed search, there's a difference between their traversal way. When a parent is visited and expanded in UCS, the UCS will choose that child which ~~have~~ has the lowest path cost among the current children. But a plain BFS doesn't care about the path cost in any way. Instead of going directly to the children node, it ~~ch~~ goes to the next node of the current level or goes to the next level. It doesn't pay any heed to the path cost.

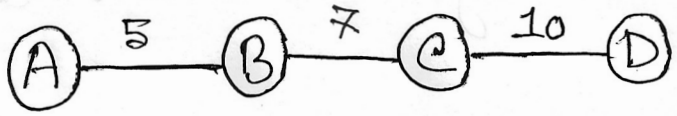
Ans to Q No - 5

a

Let $C(N)$ be the cost of the optimal path from N to a goal node. Now, the heuristic function $h(N)$ is admissible if,

$$0 \leq h(N) \leq C(N).$$

b



State	h(N)
A	20
B	13
C	7
D	0

In this example, the heuristic function is admissible.

Path cost from A to D = 5+7+10 = 22

$\therefore h(A) = 20 <= 22$

Similarly, Path cost (B → D) = 7+10 = 17

$\therefore h(B) = 13 <= 17$

And, path cost (C → D) = 10

$\therefore h(C) = 7 <= 10.$

[Therefore, heuristic]