8/9/25

Apply A* Algorithm

misplaced Tiles

Manhatten distance

Q.

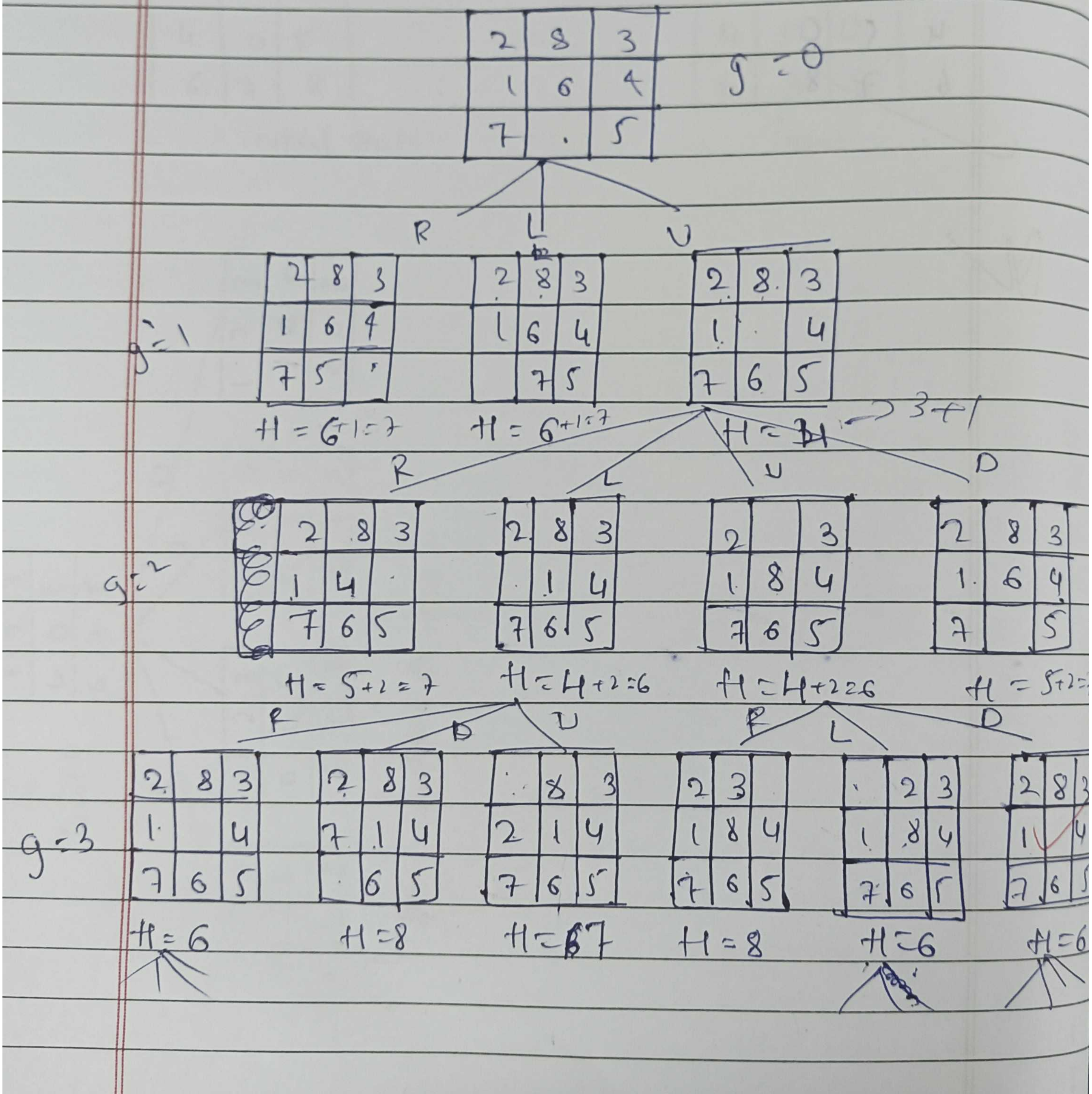
2	8	3
1	6	4
7		5

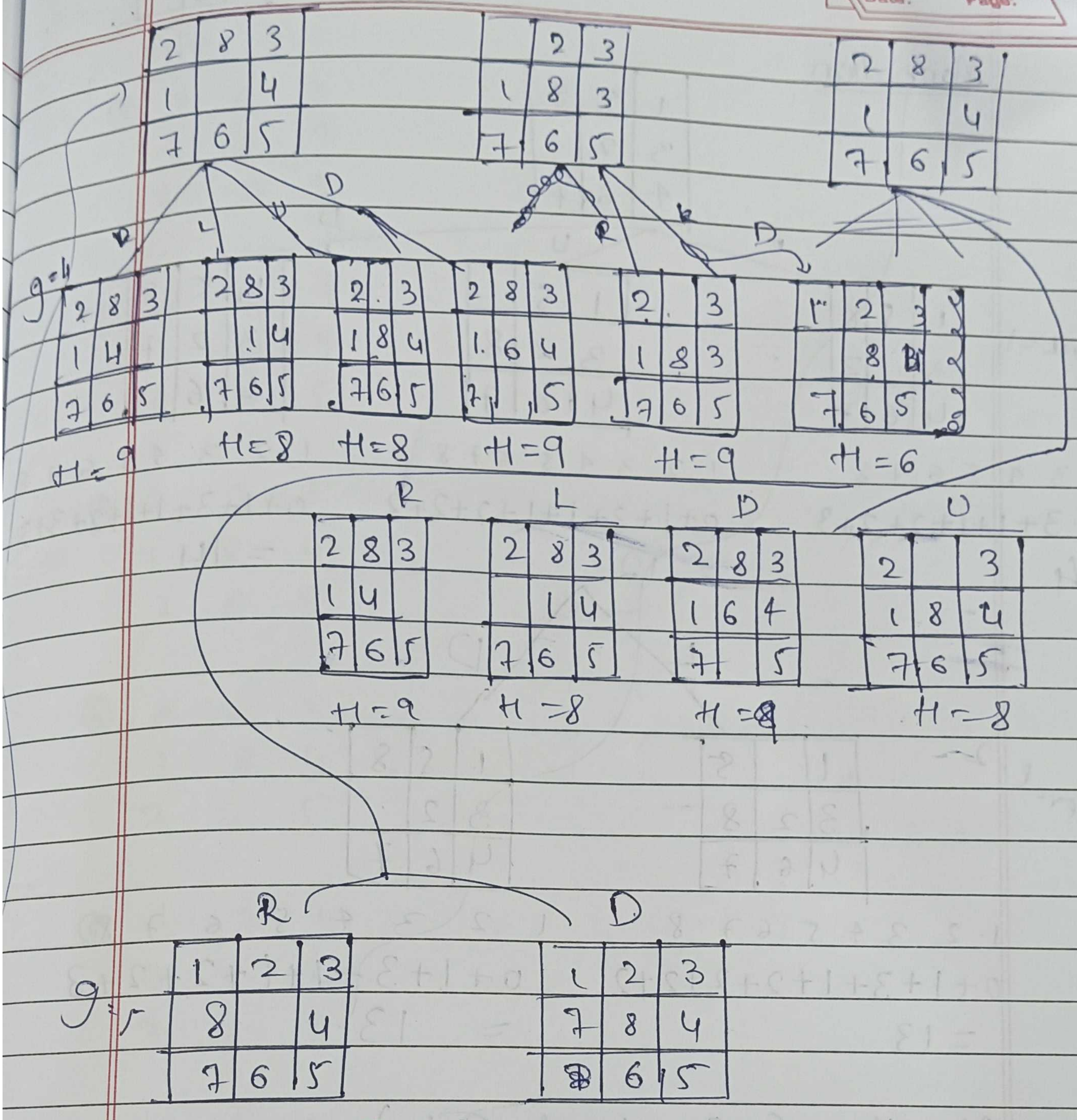
initial state

1	2	3
8		4
7	6	5

goal State

$$f(n) = g(n) + h(n)$$





Q. Manhattan

1	5	8
3	2	
4	6	7

initial State.

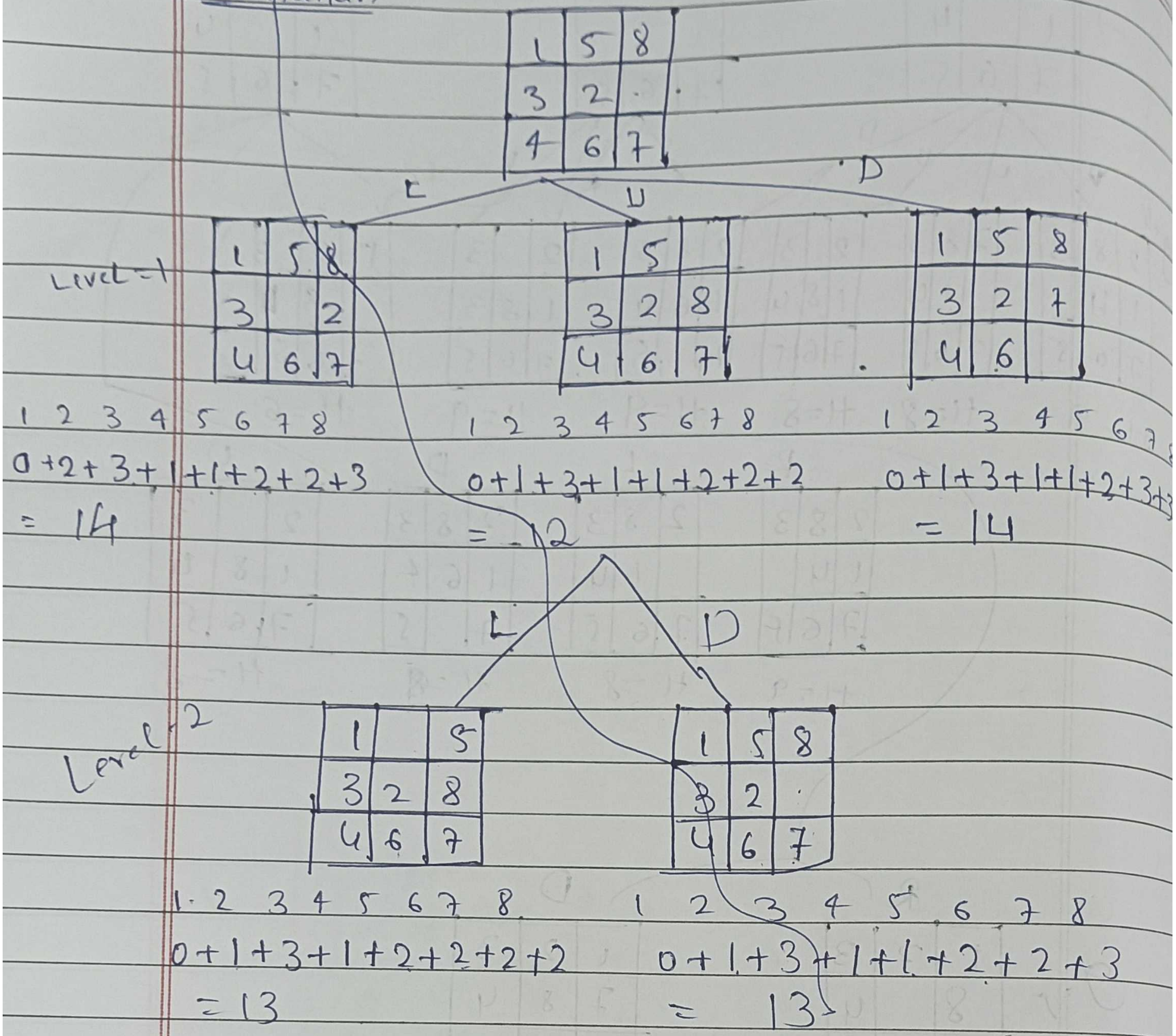
1	2	3
4	5	6
7	8	

Goal State

goal :

1	2	3
4	5	6
7	8	

Manhattan



1	5	8
3	2	
4	6	7

L:

1	5	8
3		2
4	6	7

1 2 3 4 5 6 7 8

0+2+3+1+1+2+2+3

= 14

U:

1	5	
3	2	8
4	6	7

1 2 3 4 5 6 7 8

0+1+3+1+1+2+2+2

= 12

D:

1	5	8
3	2	7
4	6	

1 2 3 4 5 6 7 8

0+1+3+1+1+2+3+3

= 14

Level 2

L:

1		5
3	2	8
4	6	7

1 2 3 4 5 6 7 8

0+1+3+1+2+2+2+2

= 13

D:

1	5	8
3	2	
4	6	7

1 2 3 4 5 6 7 8

0+1+3+1+1+2+2+3

= 13

Algorithm (Mis placed Tiles)

```
1. Start -> put initial state in Open $
2. Pick state with smallest
3. If goal stop
4. Expand neighbors
5. for each neighbor
        g : = parent . g +1
        h = misplaced tiles
        f = g+h
        add/update in Open
6. Repeat untill goal found (or) open empty.
```

O/P.

① 2 8 3
1 6 4
7 0 5

② 2 8 3
1 0 4
7 6 5

③ 2 0 3
1 8 4
7 6 5

④ 0 2 3
1 8 4
7 6 5

⑤ 1 2 3
0 8 4
7 6 5

⑥ 1 2 3
8 0 4
7 6 5

15/4

goal :-

1	2	3
8		4
7	6	5

Mahattan

2	8	3
1	6	4
7		5

R

2	8	3
1	6	4
	7	5

L

2	8	3
1	6	4
7	5	

U

2	8	3
1		4
7	6	5

1 2 3 4 5 6 7 8

1+1+0+0+0+1+1+2

6

1+1+0+0+1+1+0+2

6

1+1+0+0+0+

=4

L

2	8	3
	1	4
7	6	5

2+1+0+0+0+0+0+2

= 5

R

2	8	3
1	4	
7	6	5

1+1+0+1+0+

0+0+2 =5

U

2		3
1	8	4
7	6	5

1+1+0+0+

0+0+0+1 =3

D

2	8	3
1	6	4
7		5

1+1+0+0+0+

1+0+2 =5

L

	2	3
1	8	4
7	6	5

1+0+0+0+0+0+

0+1 =2

R

2	3	
1	8	4
7	6	5

1+1+1+0+0

0+0+1 =4

D

2	8	3
1		4
7	6	5

1+1+0+0+0+0+

0+2 =4

D

1	2	3
	8	4
7	6	5

R →

1	2	3
8		4
7	6	5

0+0+0+0+0+

0+0+1 =1

Algorithm.

①. Start with current pazzle state

②. Create an empty list to keep track of file matches

③. For each file from 1 to 8:
→ if the file is in cur. pos, add 0 to the list
→ otherwise, add 1 to the list.

④. Check the list:
0+0+2 → if the list contains all 0's the puzzel is solved = stop.
→ otherwise, make a move to get closer to the goal.

⑤. Repeat Steps 2 to 4 until, the puzzke is solved.

Output:
solution path:

2	8	3
1	6	4
7	0	5

⇓

2	8	3
1	0	4
7	6	5

⇓

2	0	3
1	8	4
7	6	5

0	2	3
1	8	4
7	6	5

⇓

1	2	3
0	8	4
7	6	5

⇓

1	2	3
8	0	4
7	6	5