ASSignment 1A

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Subject AI

DoP	DoA	Marks	Sign

(Q2) Consider following instance of 8 puzzle problem:

8	7	6
2	1	5
3	4	-

Initial

-	8	7
2	1	6
3	4	5

final Configration.

Consider Hewristic funtion defined below:

h1 : Hisplaced tile Count except space
h2 : Carrectly placed files Cant except space
h3 : Sum of Manhattan distance between Current and Corrent Position of all tiles except spac

Answer the following question

(a) In 8-puzzle Problem we are concerned with getting to goal Configurat within least number of steps All Moves are the equally Costly Define g(n) in your own words what will be the cost of 6 steps Solution to some Orbitrary 8-puzzle instance

Ans:- The lowest path Cost g(n) can be the Cost to reach the goal Configuration in least steps In our case, we can reach the final Configuration in at least 4 Moves: Up, Left, Left Since all the Moves are equally Costly, we Compute g(n) as

$g(n) = 1+1+1+1$

$g(n) = 4$

Consider the following arbitrary 8-puzzle instance which gives solution in 6 steps

8	7	6
2	1	5
-	3	4

The solution can be represented as:

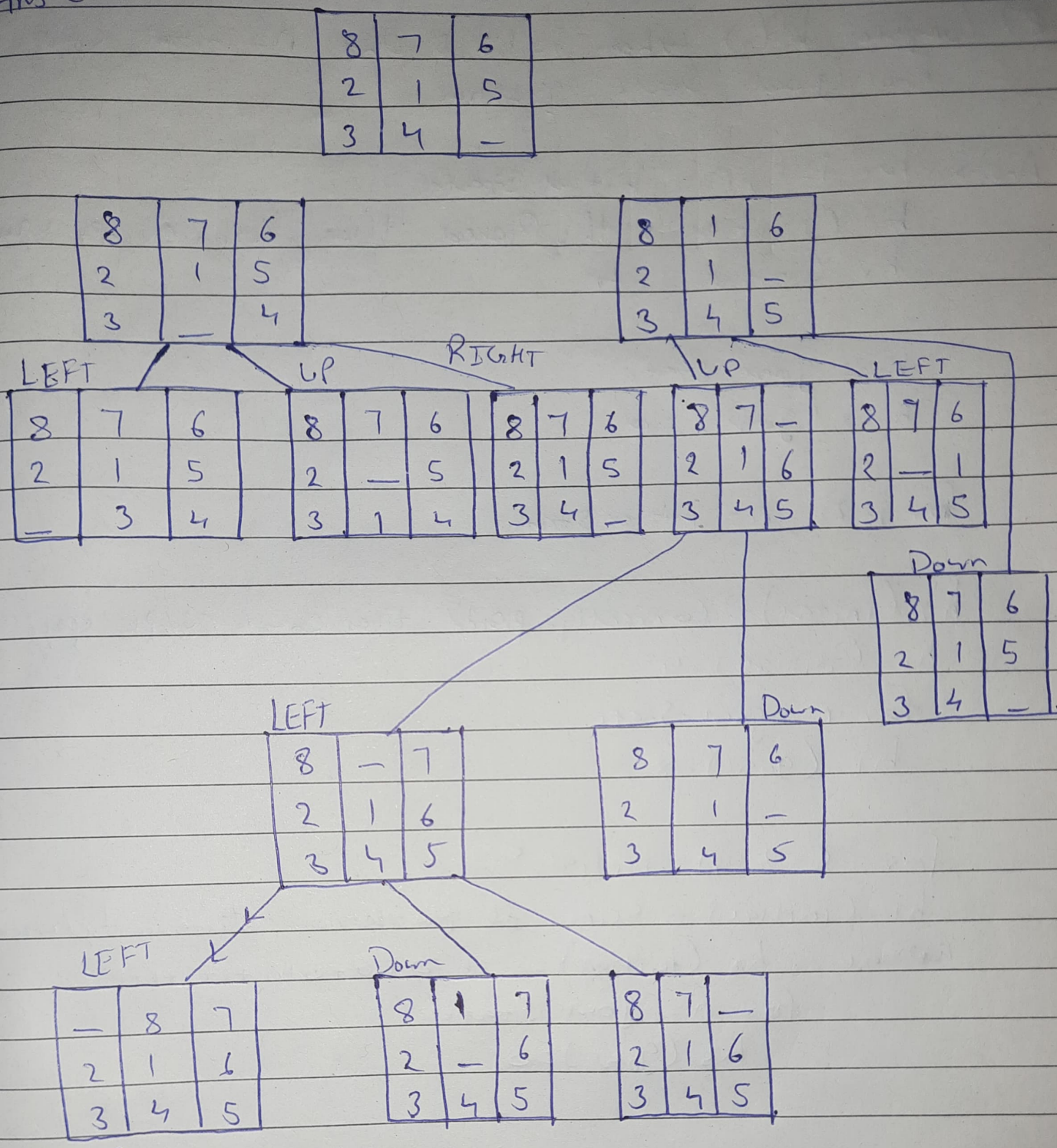
{{8,7,6},{2,1,5},{_,3,4}} → {{8,7,6},{2,1,5},{},_,4}}

→ {{8,7,6},{2,1,5},{3,4,_}} → {{8,7,6},{2,1,_},{3,4,5}} → {{8,7,_},{2,1,6},{3,4,5}} → {{8,_,7},{2,1,6},{3,4,5}}

Since all the moves are equally costly, the cost could be g(n) = 1

(c) Draw exhausting state space tree of depth limited to 4 for instance of 8-puzzle problem in the previous

Ans (→


LEFT
UP
RIGHT
UP
LEFT
Down
LEFT
Down
LEFT
Down
final
configuration

e) Compute $h_i(n)$ when $i = 1, 2, 3$ and n = initial State, final/goal State question

Ans → for $i = 1$, n = initial State

h_1 (initial = this Placed tiles count except space

h_1 (initial = 4

n = goal State

h_1 = (goal)' = 0

for $i = 2$, n = initial State

h_2 (inital) = Correctly placed tiles count except space

h_2 (initial) = 4

for n = goal State

h_2 (goal) = 8

for $C = 3$, n = initial State

h_2 (initial) = Sum of Manhattan distance between current h_3 (initial) = -1 0 + 0 + 0 + 0 + 1 + 1 + 1 + 1

for n = goal State

h_3 (goal) = 0