

## Assignment No - 1 A

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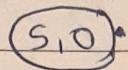
## class :- BE/IT

DOP	DOC	Marks	Sign.

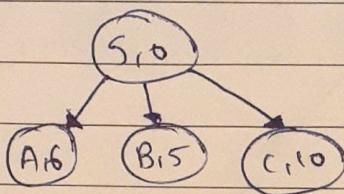
# Assignment no - 1 (A)

Q. 1

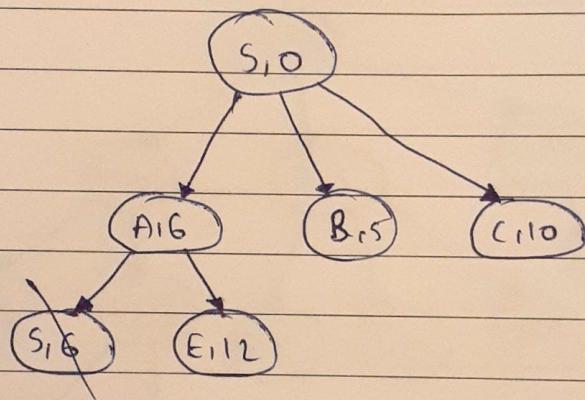
1. J  
→ Step 0 :



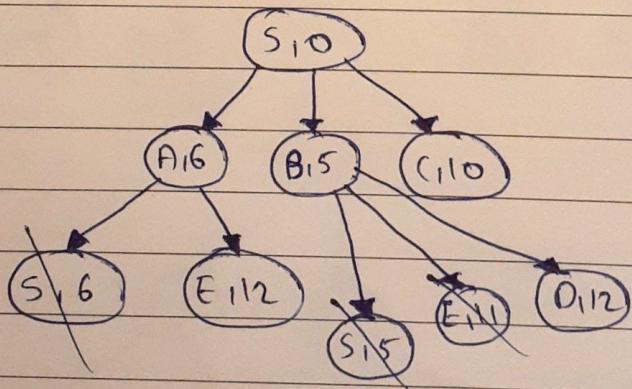
Step 1 :



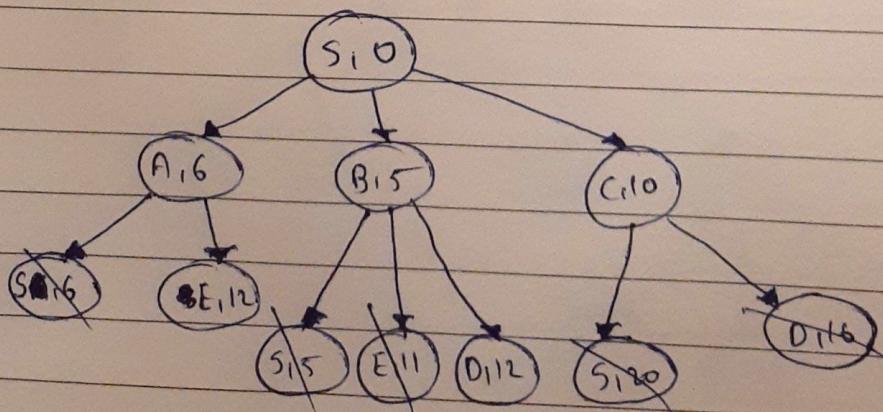
Step 2 :



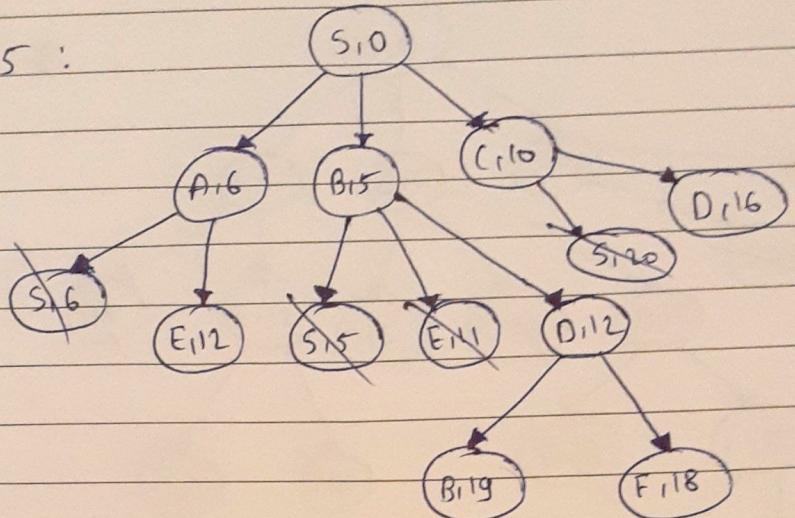
Step 3 :



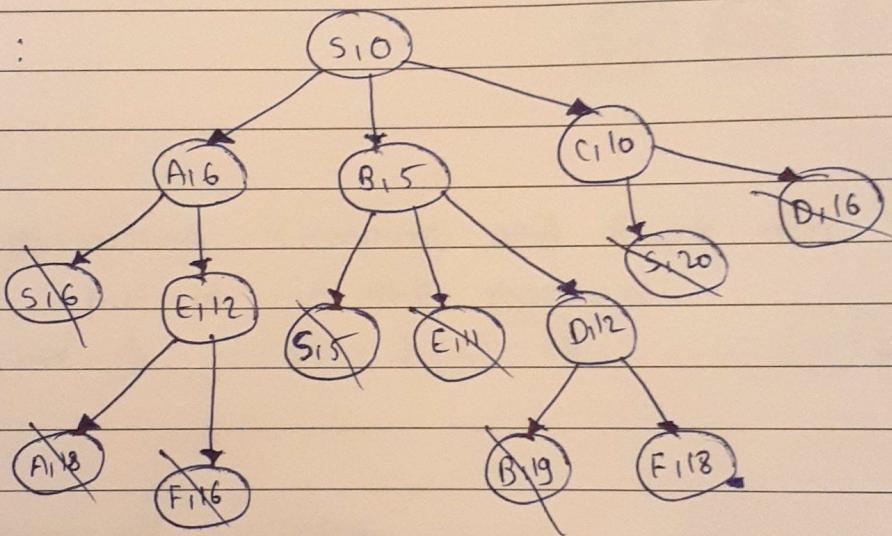
Step 4 :



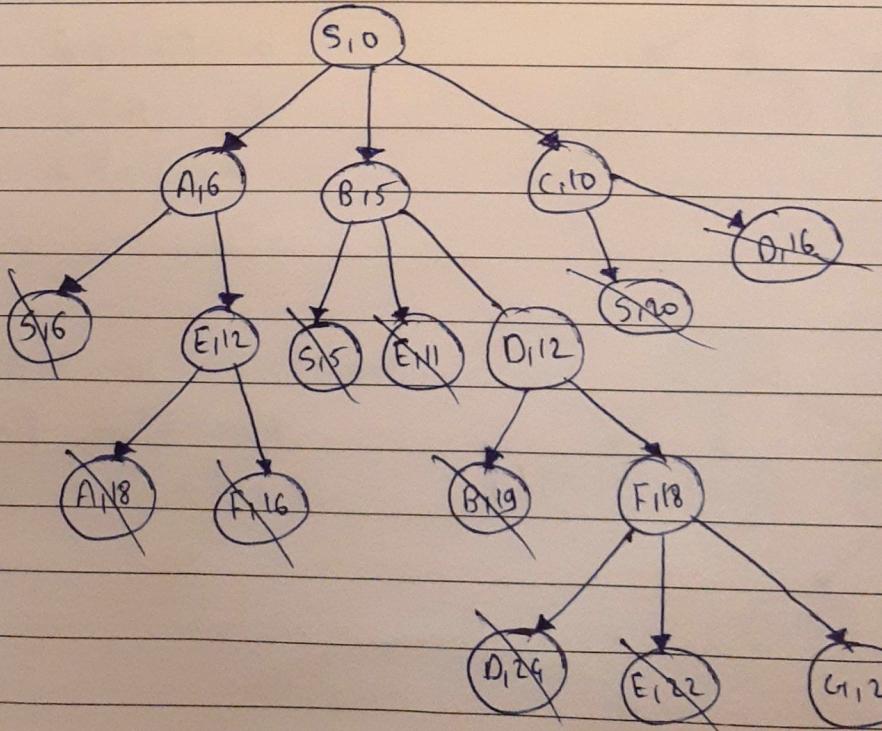
Step 5 :



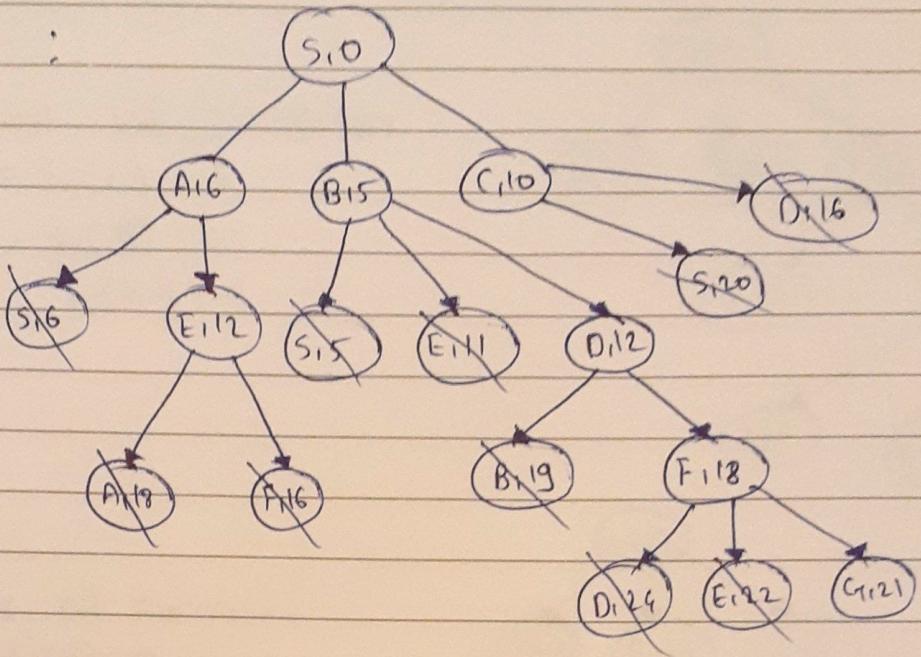
Step 6 :



Step 7 :



Step 8 :



1.9

Initialization : Compute and score for S and put it in the openlist.

$$F\text{-score } S: f(S) = h(S) = 17$$

S<sub>17</sub>

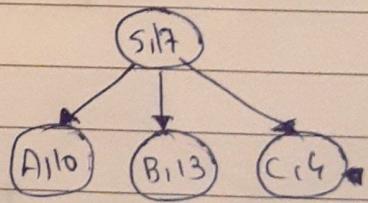
Step 1 :

F - score of successor

$$f(A) = h(A) = 10$$

$$f(B) = h(B) = 13$$

$$f(C) = h(C) = 4$$

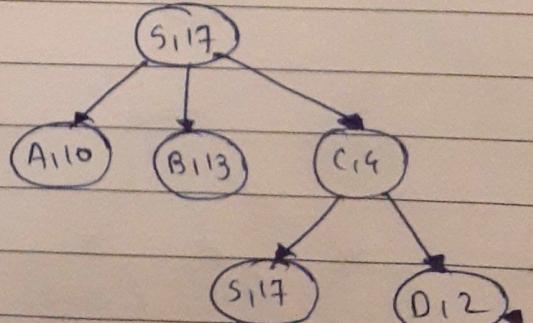


Step 2 :

F - score of successors

$$f(S) - h(S) = 17$$

$$f(D) = h(D) = 2$$



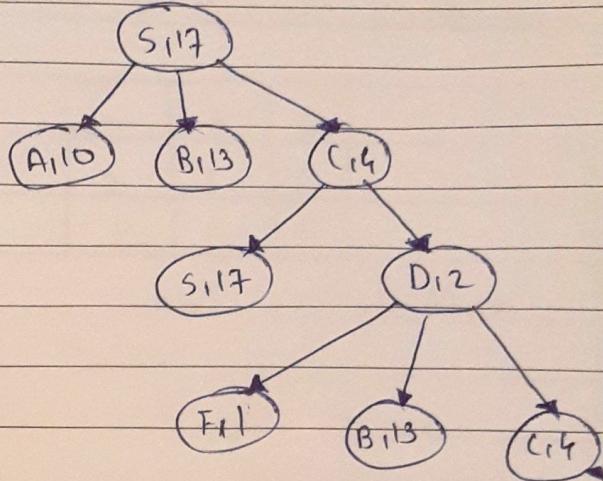
Step 3 :

F - Score of Successor

$$f(C) = h(C) = 4$$

$$f(B) = h(B) = 13$$

$$f(F) = h(F) = 1$$



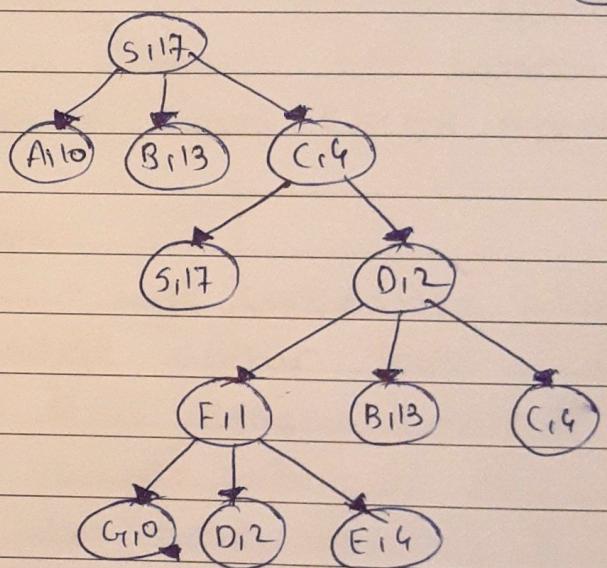
Step 4 :

F - Score of successor

$$f(D) = h(D) = 2$$

$$f(E) = h(E) = 4$$

$$f(G) = h(G) = 0$$

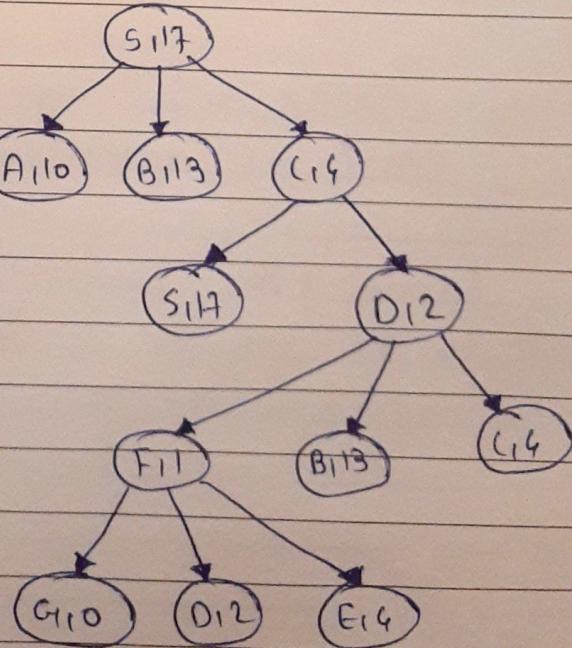


Step 5 :

solution is -

S → C → D → F → G with

Solution cost :  $10 + 6 + 6 + 3$   
 $= 25$



Q2 Consider following instance of 8 puzzle problem.

8	7	6
2	1	5
3	4	-

Initial configuration

-	8	7
2	1	6
3	4	5

Goal configuration

Consider Heuristic function define below:

$h_1$ : misplaced tiles count except space

$h_2$ : correctly placed files count except space

$h_3$ : sum of manhattan distance bet<sup>n</sup> current and correct position of all tiles except space.

Answer following questions:

- a) In 8 puzzle problem we are concerned with getting to goal configuration within least number of steps. All moves are thus equally costly. Define  $g(n)$  in your own words. what be the cost of 6 step solution to some arbitrary 8 puzzle instance?

→

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, UP, LEFT, LEFT. Since all 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 :-

$$\{ \{ 8, 7, 6 \}, \{ 2, 1, 5 \}, \{ -, 3, 4 \} \} \rightarrow \{ \{ 8, 7, 6 \}, \{ 2, 1, 5 \}, \{ 3, 4, - \} \}$$
$$\{ 3, -, 4 \} \rightarrow \{ \{ 8, 7, 6 \}, \{ 2, 1, 5 \}, \{ 3, 4, - \} \} \rightarrow$$
$$\{ \{ 8, 7, 6 \}, \{ 2, 1, - \}, \{ 3, 4, 5 \} \} \rightarrow \{ \{ 8, 7, -, 4 \}, \{ 2, 1, 6 \},$$
$$\{ 3, 4, 5 \} \rightarrow \{ \{ 8, -, 1, 7 \}, \{ 2, 1, 6 \}, \{ 3, 4, 5 \} \} \rightarrow$$
$$\{ \{ -, 8, 7 \}, \{ 2, 1, 6 \}, \{ 3, 4, 5 \} \}.$$

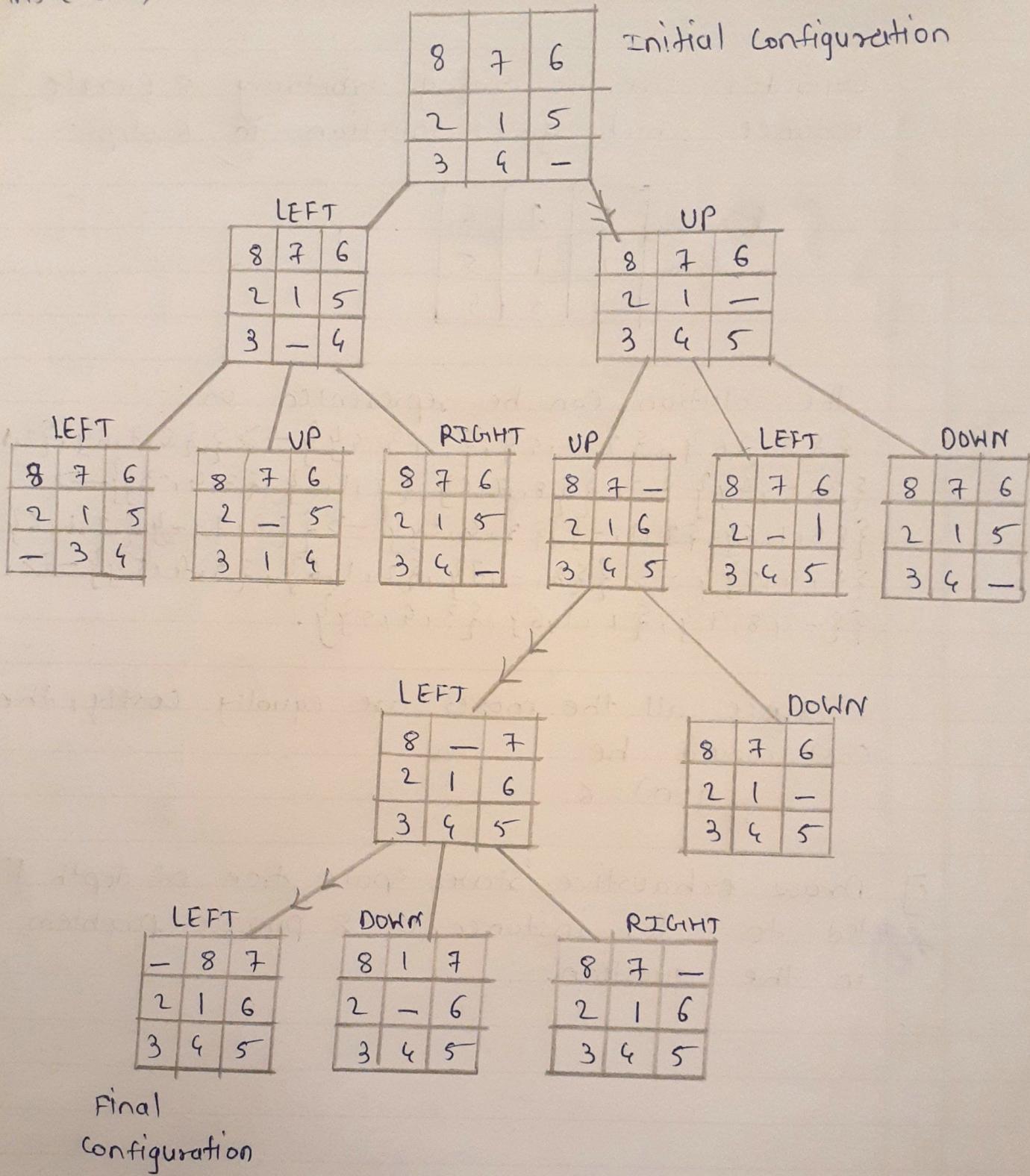
since all the moves are equally costly, the cost would be

$$g(n) = 6$$

- c] Draw exhaustive state space tree of depth limited to 4 for instance of 8 puzzle problem in the question.



Ans (c)  $\rightarrow$



e)

→ for  $i=1$ ,  $n = \text{initial state}$

$h_1(\text{initial}) = \text{misplaced files count except space}$   
 $h_1(\text{initial}) = 4$

$n = \text{goal state}$

$h_1(\text{goal}) = 0$

for  $i=2$ ,  $n = \text{initial state}$

$h_2(\text{initial}) = \text{correctly placed files count except space}$

$h_2(\text{initial}) = 4$

for  $n = \text{goal state}$

$h_2(\text{goal}) = 8$

for  $i=3$ ,  $n = \text{initial state}$

$h_3(\text{initial}) = \text{sum of manhattan distance bet^n current}$   
and correct position of all ~~files~~ tiles  
~~except~~ space.

$h_3(\text{initial}) = 0+0+0+0+1+1+1+1$   
 $= 4$

for  $n = \text{goal state}$

$h_3(\text{goal}) = 0$