22-12-23
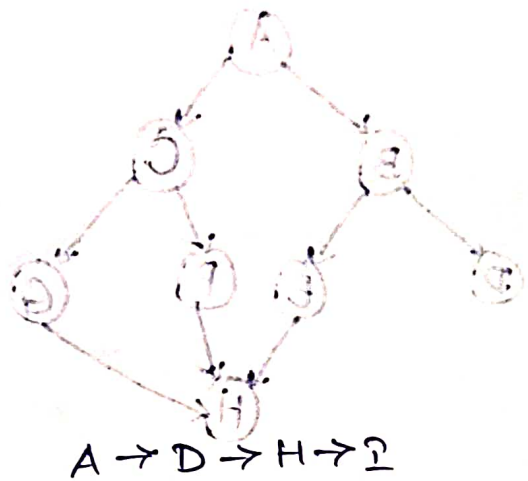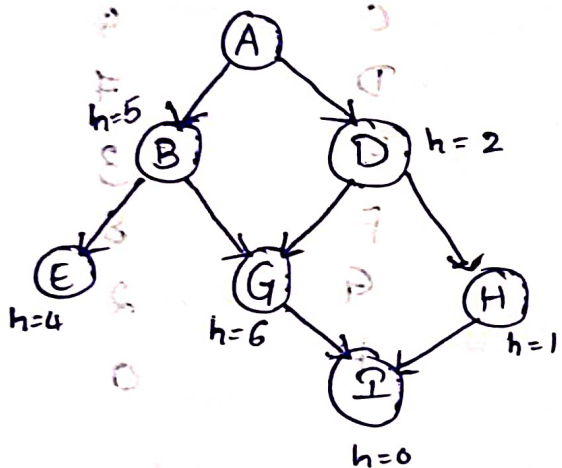
Informed Search

└ Heuristic Search (also known)

1) Greedy Best first Search

2) A*

Greedy Best first Search

$f(n) = h(n)$

when h(n) = estimated Cost from node 'n' to the goal node

f(n) = Heuristic Search

1. $A \to B = 5$
       $A \to D = 2$

2. $A \to B = 5$
       $A \to D \to G = 6$
       $A \to D \to H = 1$

3. $A \to B = 5$
       $A \to D \to G = 6$
       $A \to D \to H \to I = 0$

PRACTICE PROBLEMS:

Find the path to the Goal state using greedy best first search algorithm.
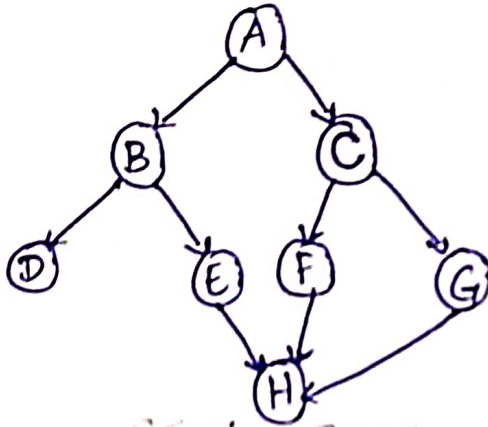
Nodes	Heuristics
A	13
B	12
C	4
D	7
E	3
F	8
G	2
H	0

1. $A \rightarrow B = 12$
    $A \rightarrow C = 4$

2. $A \rightarrow B \rightarrow E = 12$
    $A \rightarrow C \rightarrow F = 8$
    $A \rightarrow C \rightarrow G = 2$

3. $A \rightarrow B \rightarrow E = 12$
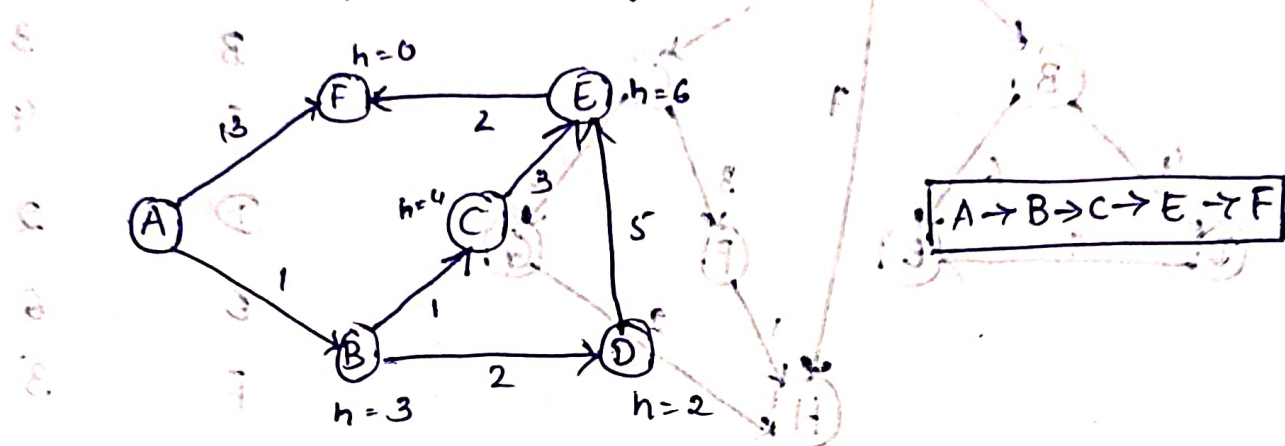 $A \rightarrow C \rightarrow F = 8$
    $A \rightarrow C \rightarrow G \rightarrow H = 0$

A^* Search Algorithm

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

$h(n)$ = cost of the path from node 'n' to goal node.

$g(n)$ = cost of the path from start node to node 'n'

$h=0$ F, $h=6$ E

$A \to B \to C \to E \to F$

$h=4$ C

$h=3$ B, $h=2$ D

1. $A \to B = f(n) = g(n) + h(n)$

$A \to B = 1 + 3 \to 4$

$A \to F = 13 + 0 \to 13$

2. $A \to F = 13$

$A \to B \to C = 1 + \$ + 4 = 6$

$A \to B \to D = 1 + 2 + 2 = 5$

3. $A \to F = 13$

$A \to B \to C = 6$

$A \to B \to D \to E = 1 + 2 + 5 + 6 = 14$

4. $A \to F = 13$

$A \to B \to D \to E = 14$

$A \to B \to C \to E = 1 + 1 + 3 + 6 = 11$

5. $A \to F = 13$

$A \to B \to D \to E = 14$

$A \to B \to D \to E \to F = 1 + 1 + 3 + 2 + 0$

Find the path to the Goal state using a* Algorithm
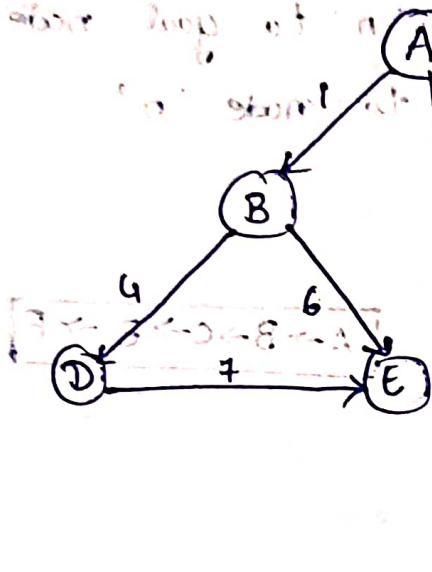
Nodes	Heuristics
A	5
B	3
C	4
D	2
E	6
F	3
G	1
H	0

1. $A \to B = 1+3 = 4$

   $A \to C = 2+4 = 6$

   $A \to H = 7 + 0 = 7$

2. $A \to C = 6$

   $A \to H = 7$

   $A \to B \to D = 1+4+2 = 7$

   $A \to B \to E = 1+6+6 = 13$

3. $A \to H = 7$

   $A \to B \to D = 7$

   $A \to B \to E = 13$

   $A \to C \to F = 2+3+3 = 8$

   $A \to C \to G = 2+2+1 = 5$

4. $A \to H = 7$

   $A \to B \to D = 7$

   $A \to B \to E = 13$

   $A \to C \to F = 8$

   $A \to C \to G \to H = 2+2+2+0 = 6$

   $\therefore$ $\boxed{A \to C \to G \to H}$