

A1:

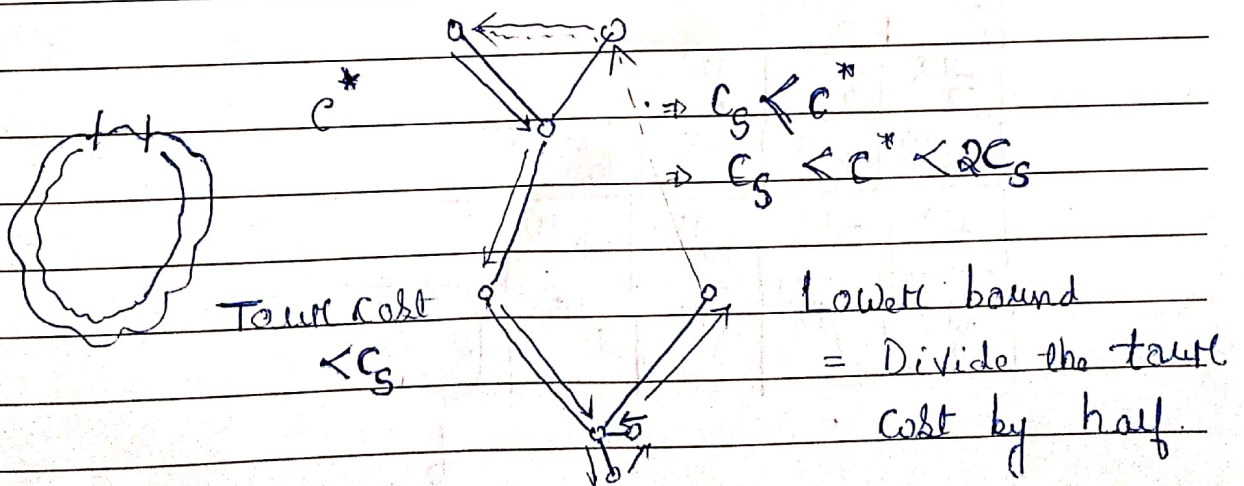
Informed State Space Search

① Notion of heuristic

— Manhattan Distance heuristic in 8-Puzzle

5	6	7		1	2	3
4	1	8	\Rightarrow	4	5	6
3	2			7	8	

— Min^m Spanning tree heuristic for TSP



— Heuristics are fundamental to chess Prog.

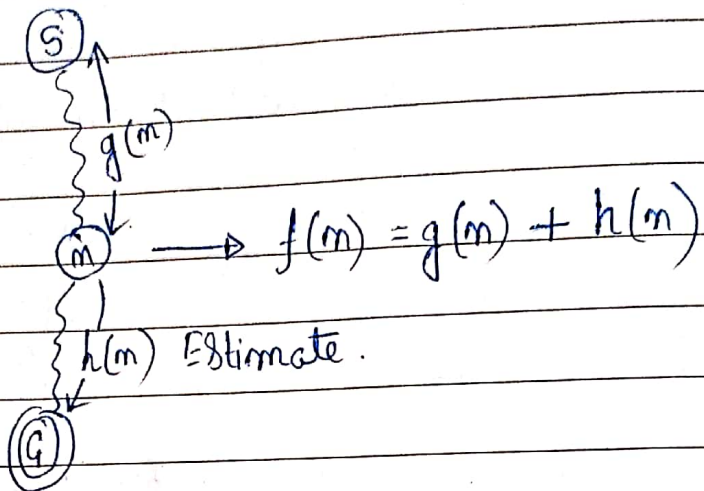
② The informed Search Problem:

$[S, s, 0, g, h]$

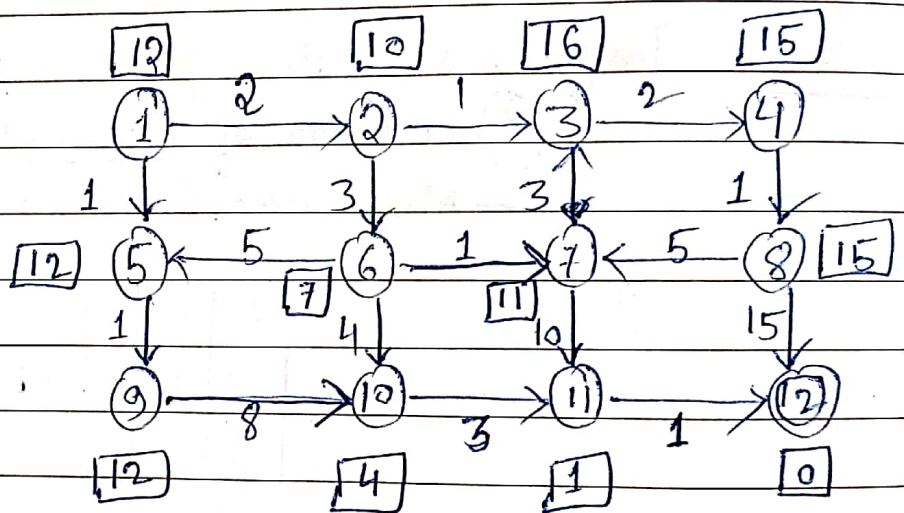
↳ h. funⁿ Estimating distance to the goal

Notes ③ Algorithm A* (Theoretical Aspects)

Date | | | |



④ Tracing of A*:



OPEN =

1⁽¹²⁾

2⁽¹²⁾

5⁽¹³⁾

3⁽¹³⁾

3⁽¹³⁾

6⁽¹²⁾

3⁽¹⁹⁾

5⁽¹³⁾

7⁽¹⁷⁾

10⁽¹³⁾

3⁽¹⁹⁾

7⁽¹⁷⁾

10⁽¹³⁾

9⁽¹⁴⁾

3⁽¹⁹⁾

7⁽¹⁷⁾

9⁽¹⁴⁾

11⁽¹³⁾

2⁽¹³⁾

Goal

CLOSED =

1⁽¹²⁾ 2⁽¹²⁾

6⁽¹²⁾ 5⁽¹³⁾

10⁽¹³⁾ 11⁽¹³⁾

12⁽¹³⁾

Proof.

(5) If $c(m) < c^*$ (optimal cost) then 'm' must be expanded

Let 'A' does not expand 'm'. $c(m) < c^*$

(6) Proof: A* heuristic Function

Claim: If $f(m) < c^*$, then 'm' must be expanded.

(1) The heuristic function under-estimate.

$$h(m) \leq f^*(m)$$

↳ Cost of Reaching goal from 'm'.

(2) All costs are Positive.

