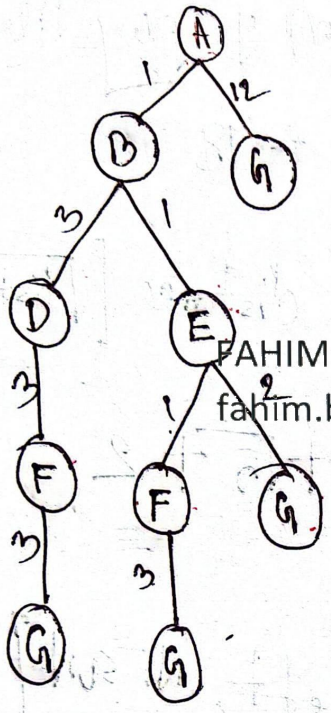
"Mid Topic – AI"

Uniform Cost Search (UCS):



$\Rightarrow A \to B = 1$

$A \to G = 12$

$A \to B \to D = 3$

$\Rightarrow A \to B \to E = 4$

$A \to B \to E \to F = 3$

$A \to B \to E \to G = 9$

$A \to B \to E \to F \to G = 6$

$A \to B \to D \to F \to G = 10$

Ans: $A \to B \to E \to G \Rightarrow (9)$ Lowest

Heuristics 8-Puzzle Problem

7	2	4
5	*	6
8	3	1

Initial state

*	1	2
3	4	5
6	7	8

Final state

⇒ Number of misplaced state, $h_1 = 8$

⇒ Sum of min distance of their goal Position of every tile,

$h_2 = 3+1+2+2+2+3+3+2 = 18$

⇒ h_2 = ~~Sum~~ Sum of every tile max distance [√distance]

$h_2 = \sqrt{5} + 2 + \sqrt{2} + \sqrt{2} + 2 + \sqrt{5} + \sqrt{5} + 2$

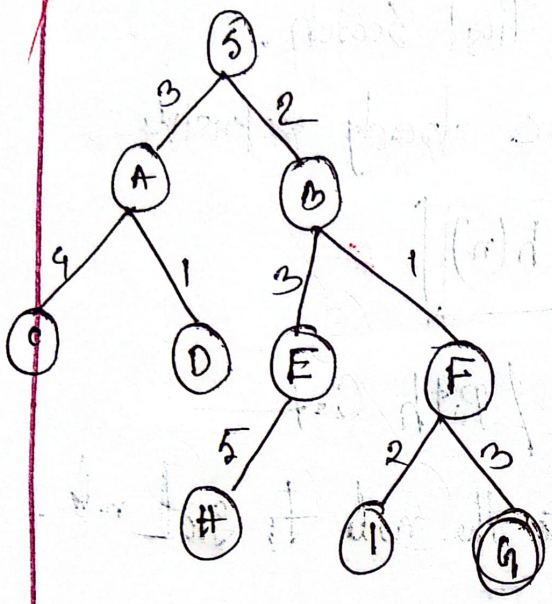
$= 19.52$

⇒ [Note: If max move is only Right/Left, No sqrt]

Max move of, $h(n) = h(1) + h(3)$

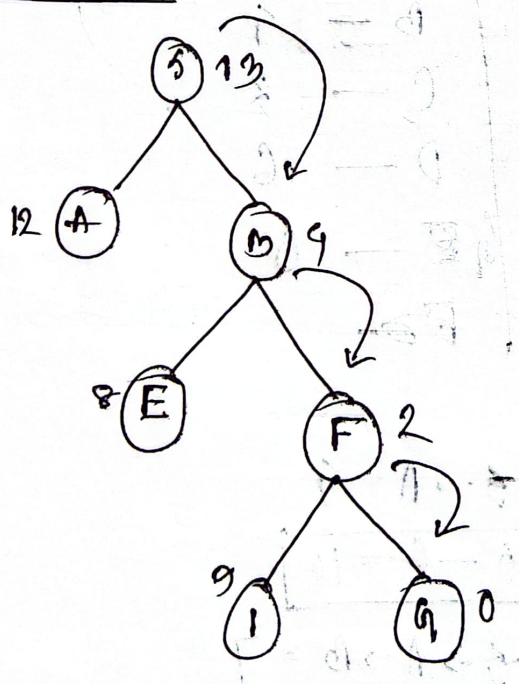
$= 8 + 18 = 26$ Ans

Greedy Best first Search (GBFS):



node	H(n)
A	12
B	4
C	7
D	3
E	8
F	2
H	4
I	9
S	13
G	0

GBFS:



Follow low heuristic first

Don't Count Path Cost.

S → B → F → G

Ans

A* Search:

⇒ Best known form of best-first search.

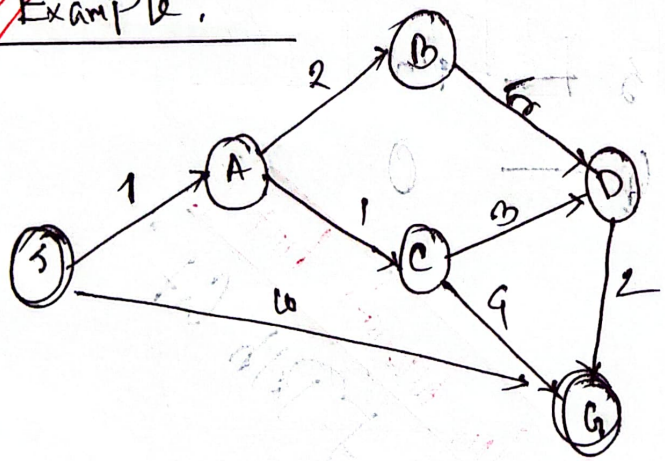
⇒ Avoid expanding paths that are already expensive

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

$g(n)$ = Cost to reach the node / Path Cost

$h(n)$ = Cost to get from the node to goal node. [heuristic value]

Example:



S — 5
A — 3
B — 4
C — 2
D — 6
G — 0

Ans:

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

$S \to G = 10 + 0 = 10$

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

$S \to A \to C = 1 + 1 + 2 = 4$

$S \to A \to C \to D = 1 + 1 + 3 + 6 = 11$

~~S → A = 4~~

S — G = 10

~~S → A → B = 7~~

~~S → A → C = 4~~

S → A → C → G = 1 + 1 + 4 + 0 = 6

S → A → B → D = 1 + 2 + 5 + 6 = 14

S → A → C → D → G = 1 + 1 + 3 + 2 = 7

S → A → B → D → G = 1 + 2 + 5 + 2 + 0 = 10

S → A → C → G

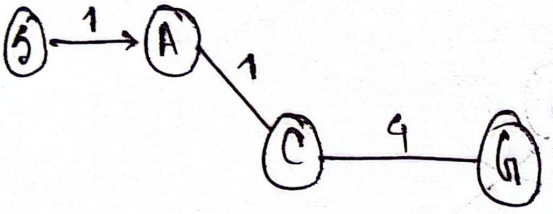
~~S → A → C → D = 11~~

S → A → C → G = 6

~~S → A → B → D = 14~~

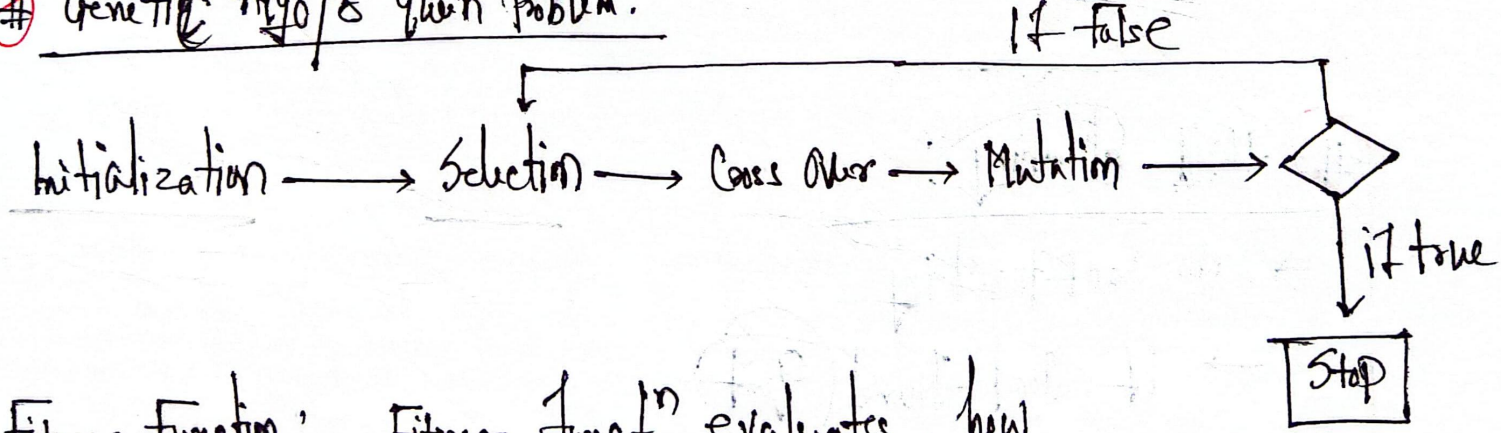
S → A → C → D → G = 7

S → A → B → D → G = 10



8-Puzzle Problem using A* Search : 55

Genetic Algo/8 queen Problem:



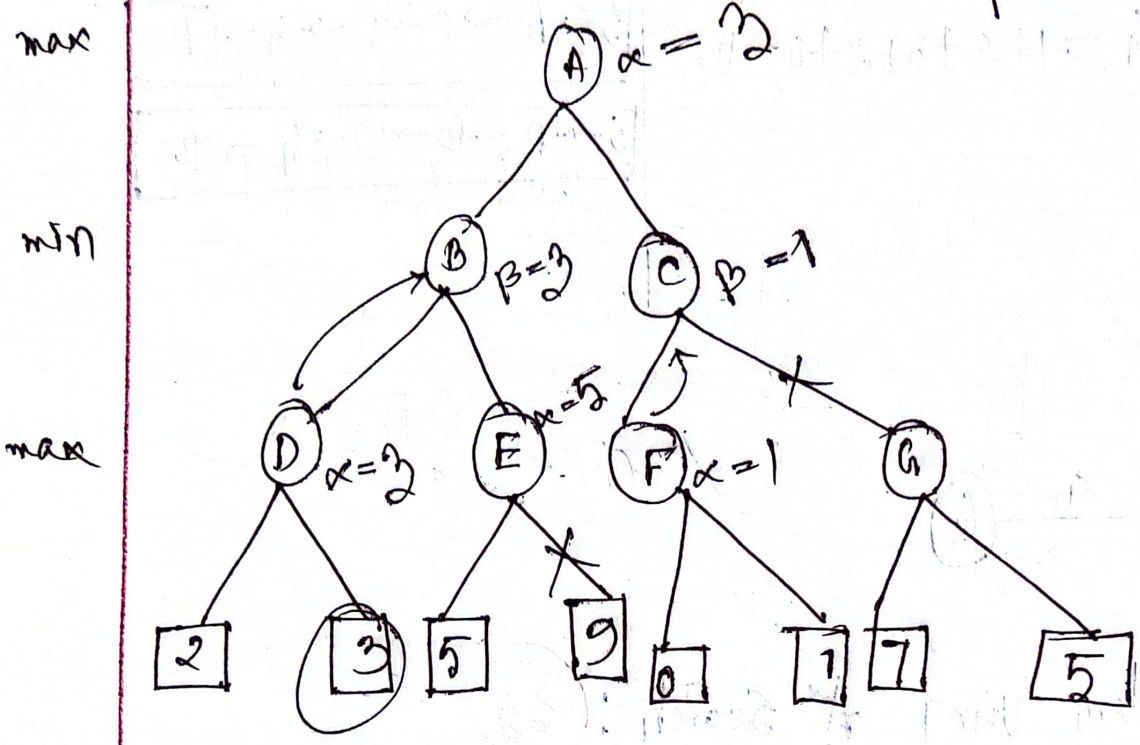
Fitness Function: Fitness Funct^n evaluates, how close a given solution is to the optimal solution of the desired Problem.

CSP:

Vertex = {All Nodes}
Domain = {Colour}
Constrain = {Conditions}

8-Queen Problem Soln : SS

Alpa-Beta Pruning :



Ans:

Hill climbing :

⇒ No backtracking

→ If goal found quit

Problem:

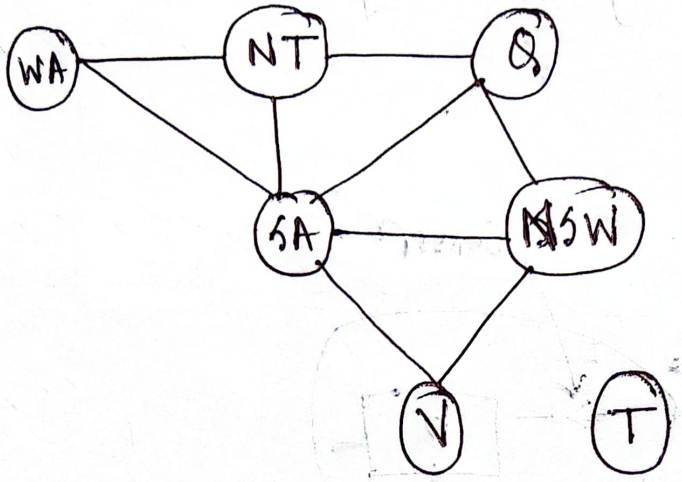
(i) Local Maximum →

(ii) Flat →

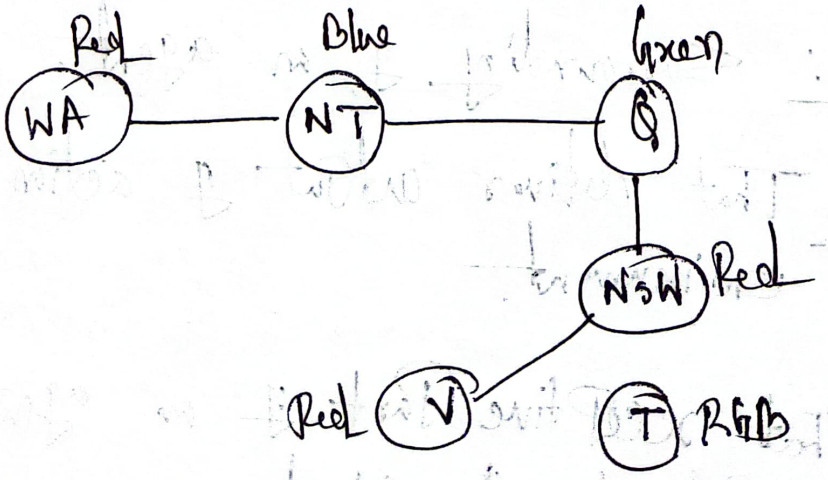
(iii) Ridge → wwww

Constraint Satisfaction Problem (CSP) :

⇒ Backtracking Algo. follow.
DFS



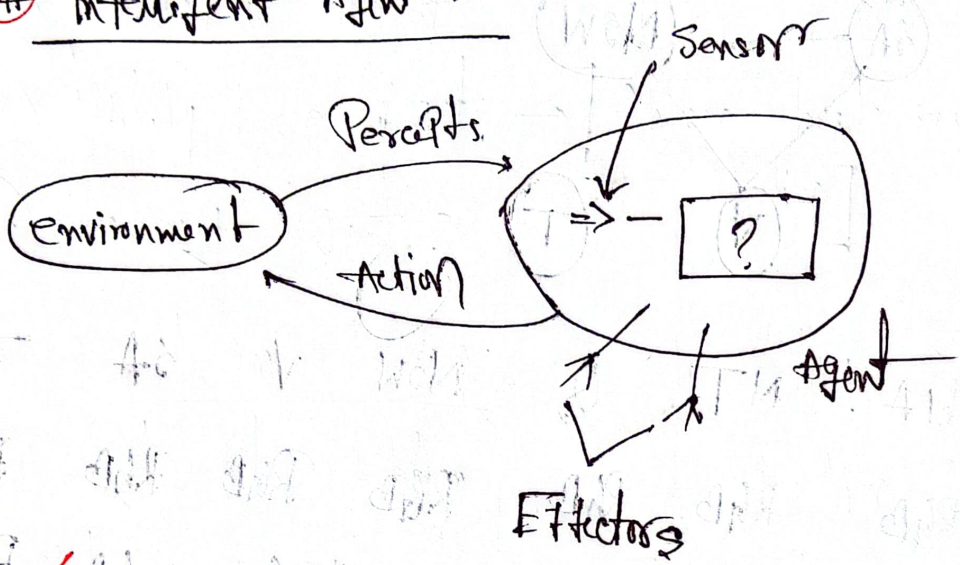
~~Initial Domain~~	WA	NT	Q	NSW	V	SA	T
Initial Domain	RGB	RGB	RGB	RGB	RGB	RGB	RGB
WA = R	R	GB	RGB	RGB	RGB	GB	RGB
Q = G	R	B	G	RB	RGB	B	RGB
V = B	R	B	G	R	B		RGB



Artificial Intelligence:

⇒ Measurement of the success of an entity in achieving it goals by interacting with its environments.

Intelligent Agent:



Rational Agent:

PEAS:

Performance Measure/Goals: Define the success of an agent.

Environment: Surrounding of an agent.

Actuators: That deliver output of action to the environment.

Sensor: That receptive part of an agent that take input for the agent.

Page

- ~~Page = the~~
- Percepts ⇒ the inputs to our system.
- Actions ⇒ The output of our system.
- Goals ⇒ Agent ~~ex~~-expected to achive
- Env. ⇒ Surrounding of agent.

Properties of Environments :

(i) Accessible / Inaccessible

(ii) Deterministics / Non-deterministic

(iii) Episodic / Non-episodic

(iv) Static / Dynamic

(v) Discreate / Continuous

(vi) With / without rational adversaries.

Type of Agents :

(i) Table lookup Driven Agent
(ii) Simple Reflex Agent
(iii) Model base reflex agent
(iv) Goal base Agent
(v) Utility base Agent → [Choose best one from multiple option]
(vi) Learning Agent.

Formulation Problem:

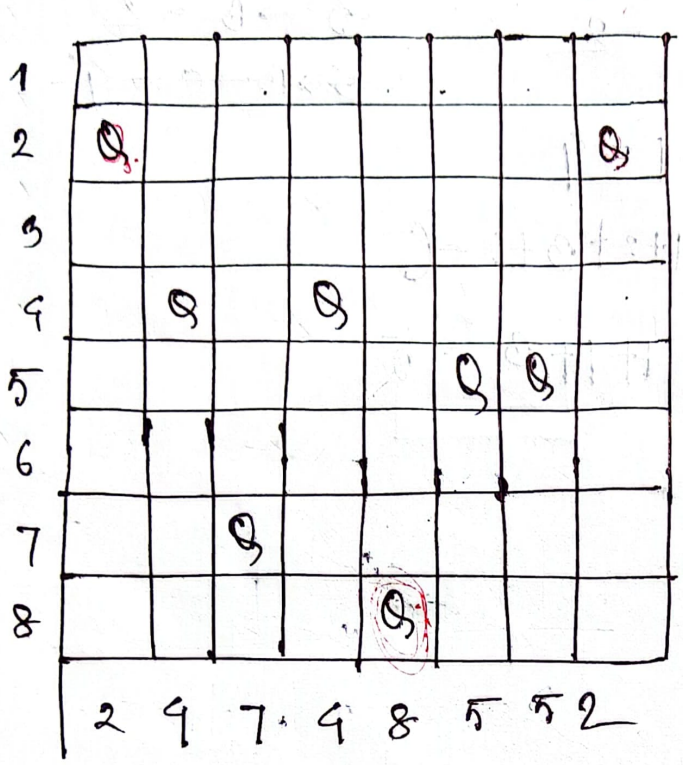
(i) Single state Problem
(ii) Multiple " "
(iii) Contingency "
(iv) Exploration "

- State ?
- Action ?
- Goal test ?
- Path Cost ?

7	2	4
1	-	3
5	6	8

State ? → The board
Action → Move left, Right - —
Goal → Tile in order
Path Cost → 1 Per move.

8 Queen Problem (Genetic Algo) :

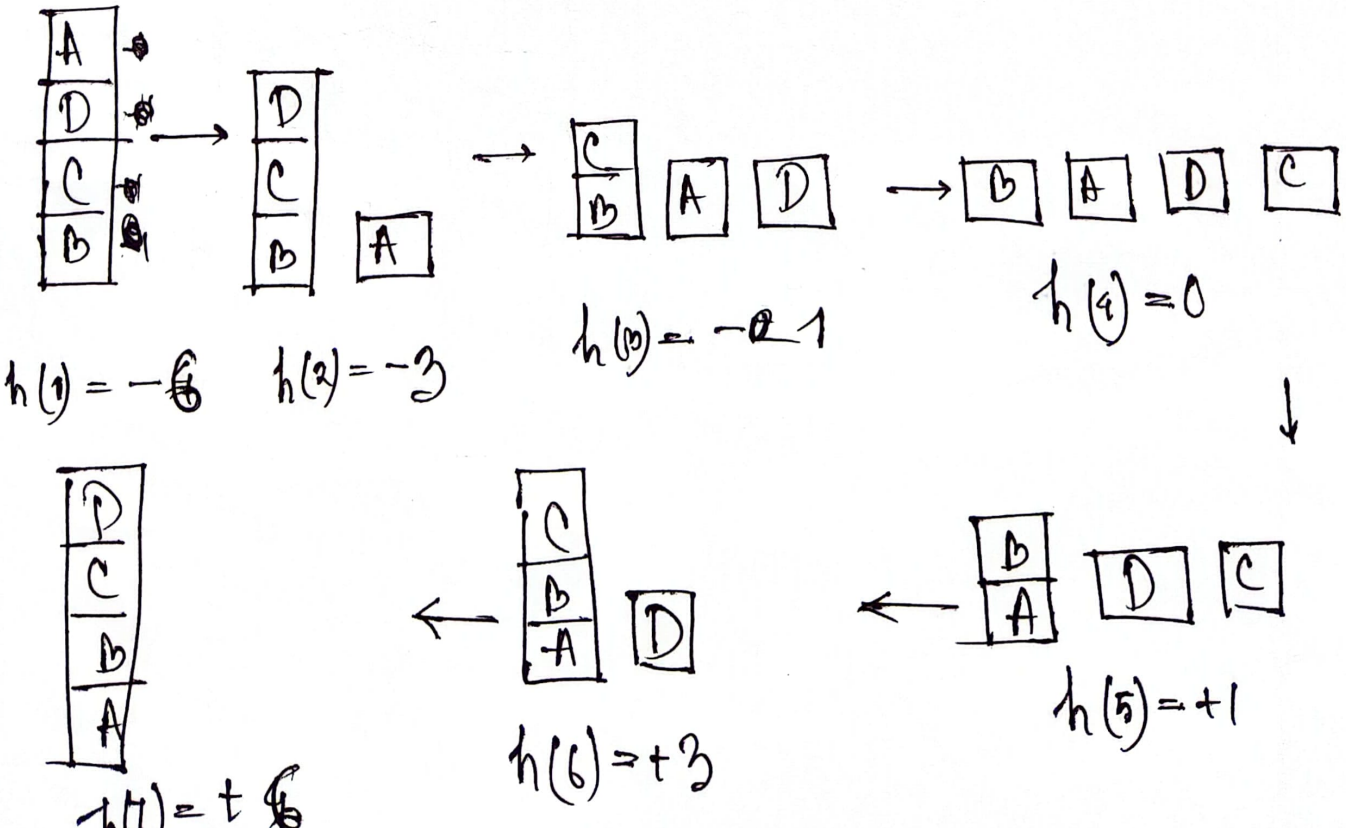


Finding non attacking Pair

$Q_1 = 6$
$Q_2 = 6$
$Q_3 = 6$
$Q_4 = 6$
$Q_5 = 7$
$Q_6 = 5$
$Q_7 = 6$
$Q_8 = 5$

$$\frac{48}{2} = 24 \text{ Pair}$$

Hill Climbing :



5 → A = 1+4 = 5

5 → A = 5

2 → B = 1+1 = 2

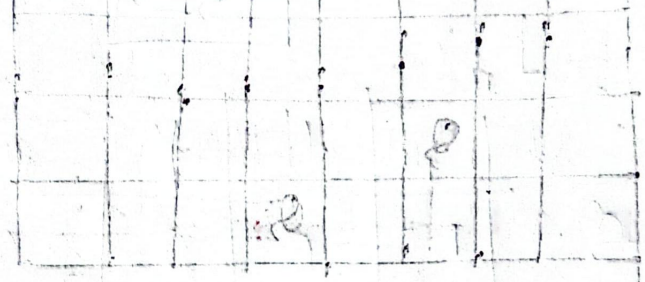
~~5 → B = 2~~

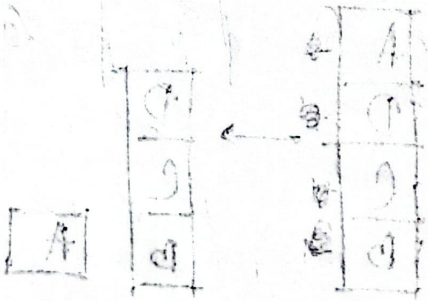
~~5 → B → C = 4~~

5 → B → C = 1+2+1 = 4

5 → B → C → 4 = 1+2+3+0 = 6

~~5 → A → C → 4~~ = 1+1+3 = 5





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