

---

---

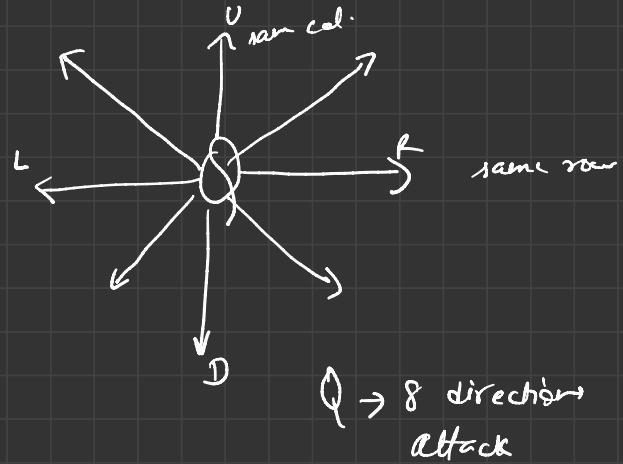
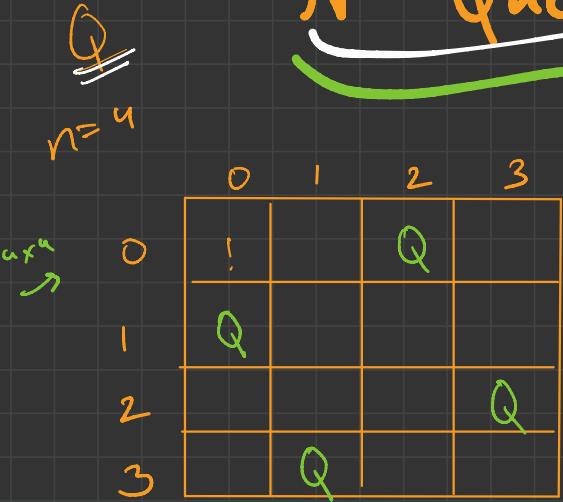
---

---

---



# N-Queen



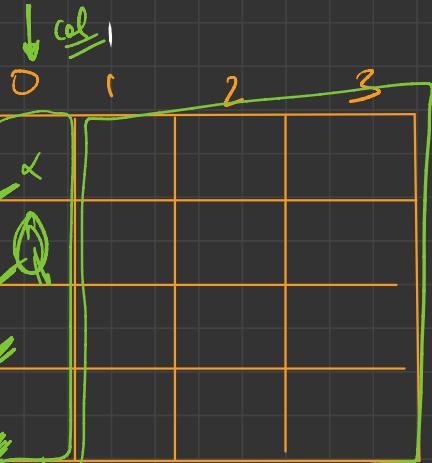
→ "N Queen" → safely place

Conditions:-

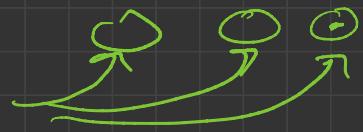
- each row → 1 Q
- each col → 1 Q
- No two Queen attack each other

approach:-

board



Q<sub>i</sub>



(d) soon row +

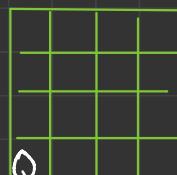
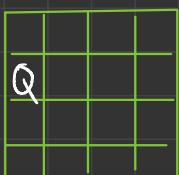
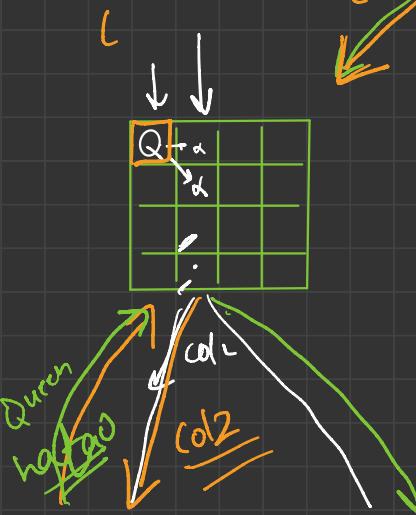
traverse

Queen place

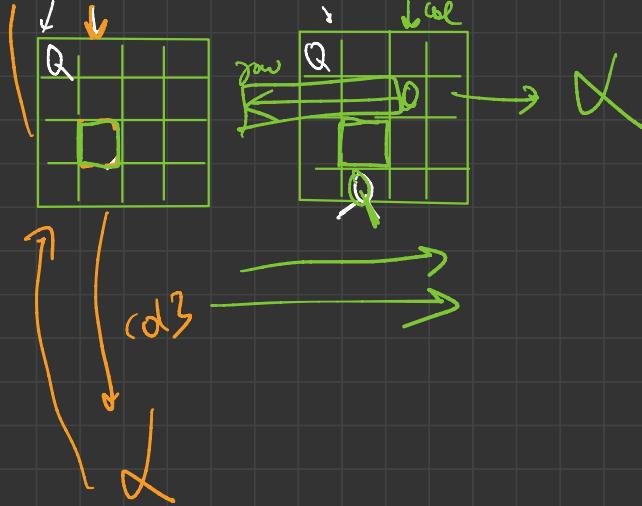
reinitial

board

Recursion

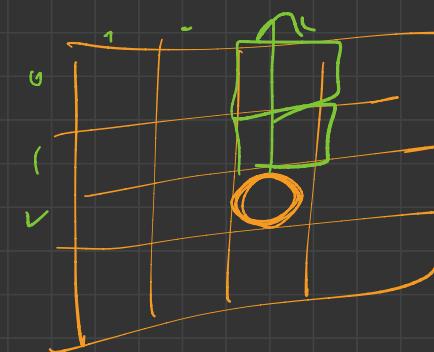


Queen  
was  
at  
col 0  
col 1  
col 2



~~safe~~

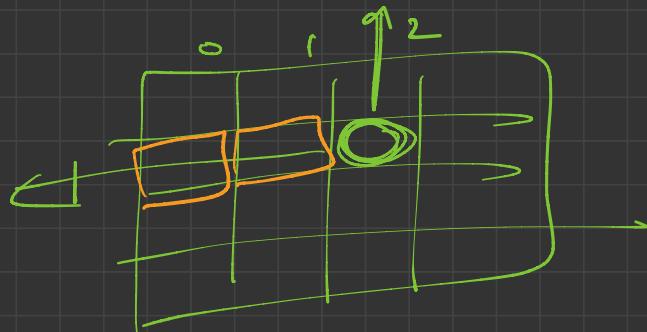
row  
+ scan row  
+ scan col  
+ scan diagonal



(R<sub>1</sub>, R<sub>2</sub>)

R<sub>1</sub>, R<sub>2</sub>

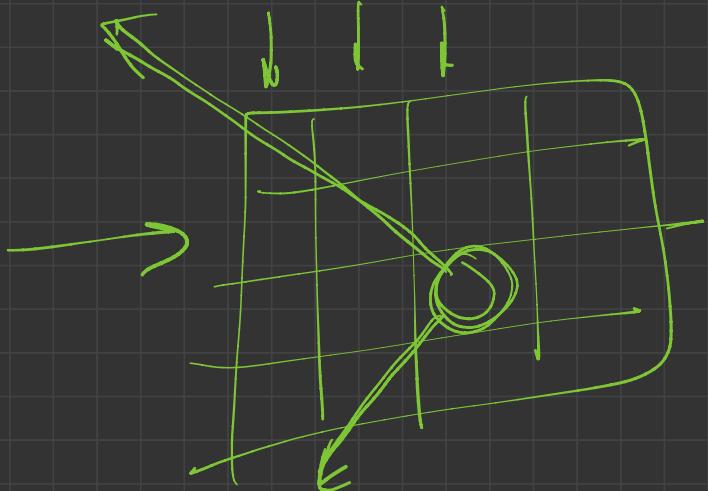
O<sub>1</sub>, O<sub>2</sub>



(1, 2)

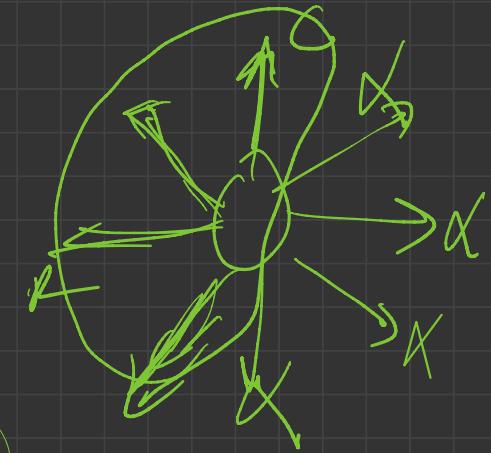
(R<sub>1</sub>, D)  
(D, O)

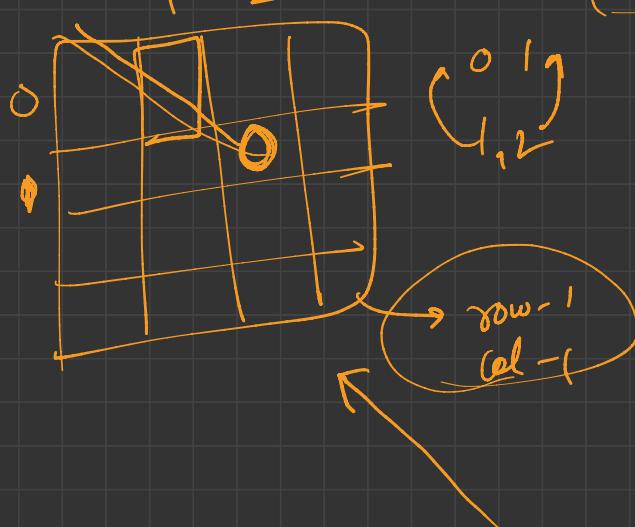
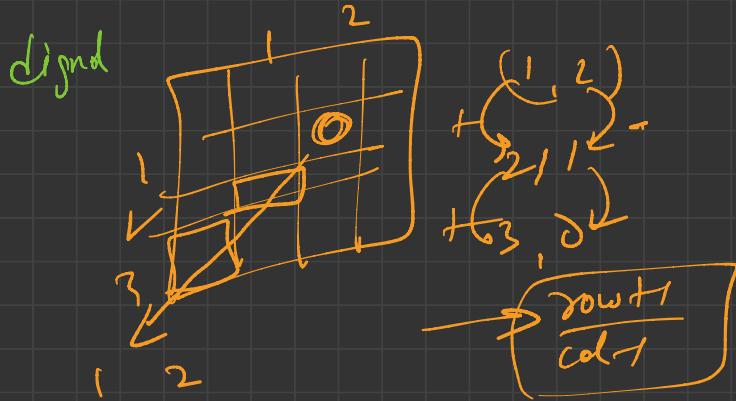
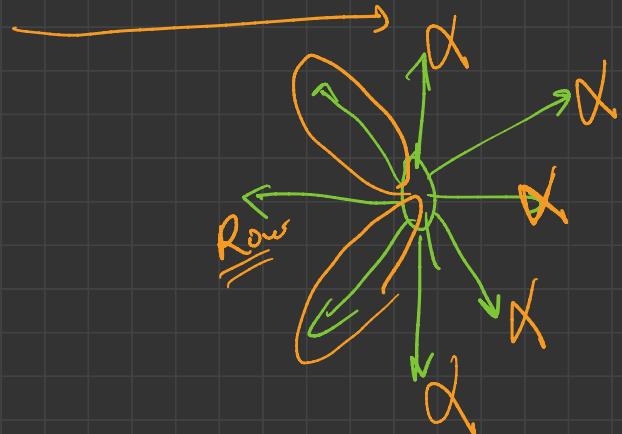
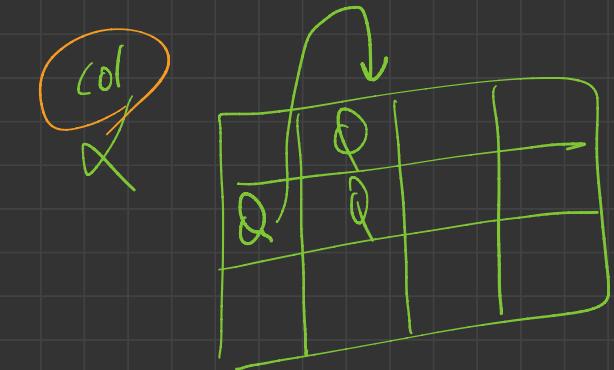
row ←  
col --



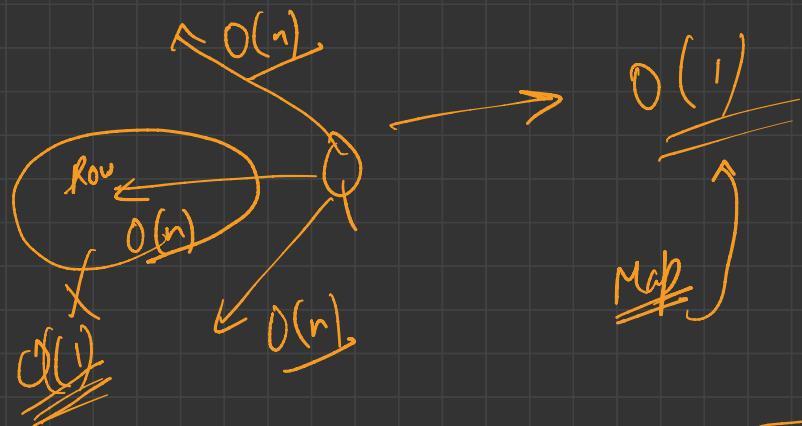
$\gamma_{\text{coll}} - 1$

$\gamma_{\text{coll}} + 1$

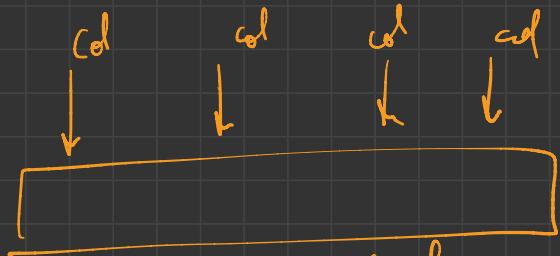




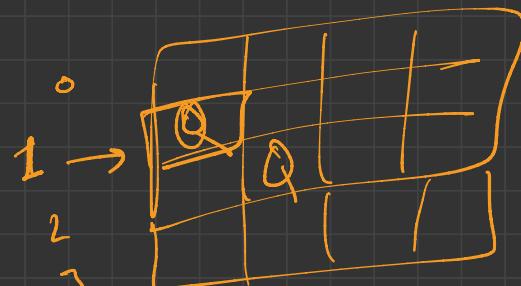
Optimization



Row



$\text{map} \rightarrow \langle \begin{matrix} \text{row} \\ 0 \\ 2 \end{matrix}, \begin{matrix} \text{col} \\ 1 \\ 1 \end{matrix} \rangle$



$\langle 1, \text{true} \rangle$

$\text{map}[1] \rightarrow \text{F}$

0	1	2	3	4	5 (col)
0	0	1	2	3	4
1		1	2	3	4
2			2	3	4
3				3	4
4					5
5					6
6					7
7					8
8					9
9					10

row

$O(n)$

$O(1)$

$O(n^2)$

map  $\langle (row+col) \rightarrow \text{True/False} \rangle$

map  $\langle ? \rightarrow \text{True} \rangle$

$row+col$

$? \rightarrow \text{TRUE}$

0	5	6	7	8	9
1	4	5	6	7	8
2	3	4	5	6	7
3	2	3	4	5	6
4	1	2	3	4	5
5	0	1	2	3	4

$mop < (n-1 + col - row) \rightarrow T/F >$

$$\begin{aligned}
 & n-1 + 5 - 0 \\
 & = 6 - 1 + 0 - 0 \\
 & = 6
 \end{aligned}$$
  

$$\begin{aligned}
 & \frac{(n-1)}{6-1} + \frac{(col-row)}{0-0} \\
 & = 5 + 2 - 1 \\
 & = 6
 \end{aligned}$$
  

$$\begin{aligned}
 & n-1 + 4 - 0 \\
 & = 6 - 1 + 4 - 0 \\
 & = 10 - 1 - 9 \\
 & = 0
 \end{aligned}$$
  

$$\begin{aligned}
 & n-1 + 5 - 1 \\
 & = 6 - 1 + 5 - 1 \\
 & = 11 - 2 \\
 & = 9
 \end{aligned}$$

$\text{map } \tau \rightarrow \text{True}$

$O(N)$   ~~$O(N)$~~   $O(1)$

(?)  $\Rightarrow$   $\Gamma \vdash$   
 $\vdash F$

