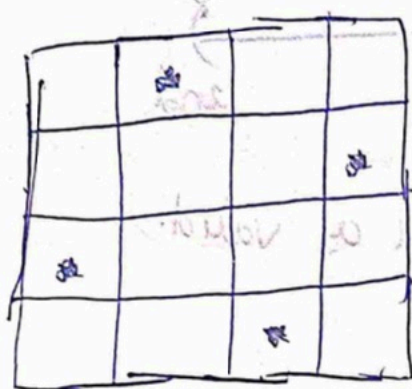


(GOOGLE)

Important New Concept \rightarrow (N Queens - II) \rightarrow (Code In LeetCode)

Q) You are being given a chess board, You have to find number of distinct ways in which you can place N queens in such a way that the queens don't attack each other.

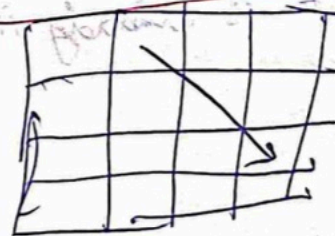
Example.



\Rightarrow 2 distinct ways

Soln Here I will introduce two important concept of a grid

Negative diagonal \rightarrow if we are travelling in the direction from top left to bottom right



1) Then we can see at the next cell,

$$\text{row}_{\text{next}} = \text{row} + 1 \text{ and } \text{col}_{\text{next}} = \text{col} + 1.$$

2) Difference between row and col remains same.

$$\text{diff} = (\text{row} - \text{col})$$



positive diagonal \rightarrow if we are travel in the direction from top right to bottom right.

1) Then we can see at the next cell.

$$\text{row}_{\text{next}} = \text{row} + 1 \text{ and } \text{col}_{\text{next}} = \text{col} - 1.$$

2) Sum of these two remains same, $\text{Sum} = (\text{row} + \text{col})$

[So we can uniquely identify a neg-diagonal and positive diagonal using a single integer.]

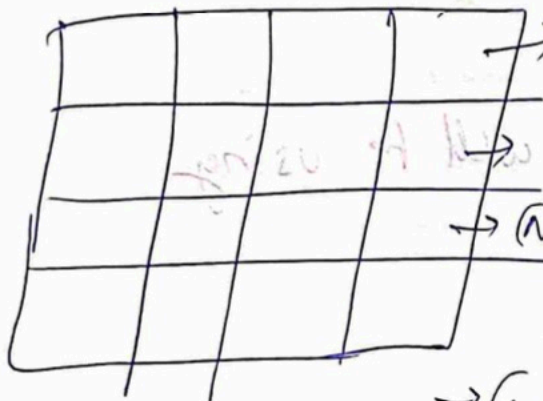
Logic

We will use back track, and at each row we will be placing queens at each column. and check for 3 things

- 1) if this column falls into the visited column list.
- 2) if this cell falls into negative diagonal visited list.
- 3) if this cell falls into positive diagonal visited list.

Complexity Analysis

$$\Rightarrow V \cdot V \cdot \text{tmp} \quad \boxed{\times \times \times}$$



→ Here we can try N different options

→ Here $(N-1)$ options.

→ $(N-2)$;

→ (1 option)

→ For each option we are going over

N columns.

$$(N \cdot (N-1) \cdot (N-2) \cdot \dots \cdot 1) [N \text{ options}] \rightarrow \boxed{N! \cdot N}$$