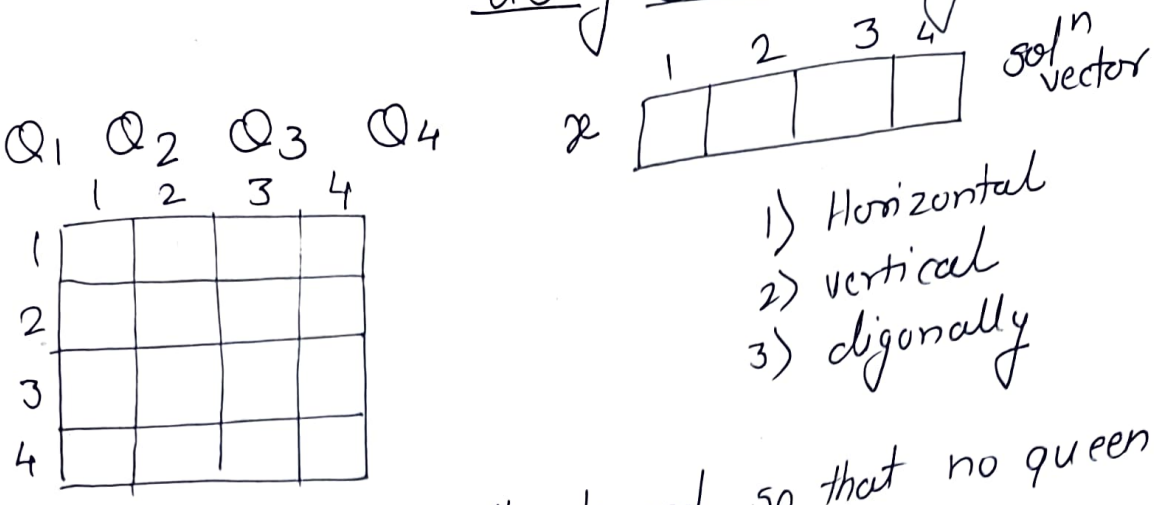
N-queens Problem using backtracking



Place all queens on the board so that no queen is under attack.

When the queen is under attack
if they are in same row, same column or same diagonal

$^{16}C_4$ — Lot many possibilites

① The constraint to be added to reduce the possibilites
- 1st row - 1st queen
- 2nd row - 2nd queen

Now we just need to decide the column for each queen so that they are not under attack.

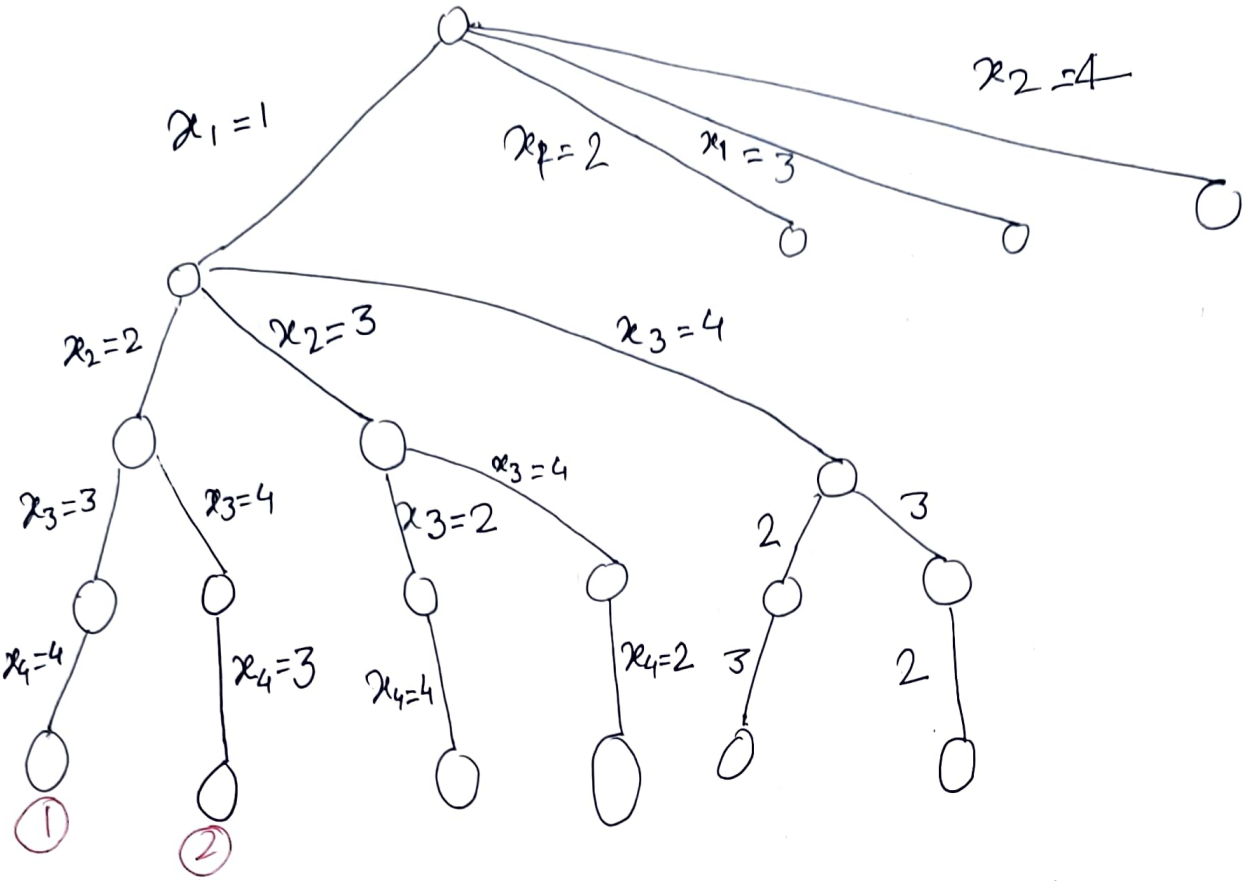
Problem is reduced.

② Two queens should not be in the same column.

So attacks
~~Same row~~
~~Same column~~
same diagonal

Now check if the queens are on the same diagon
or not.

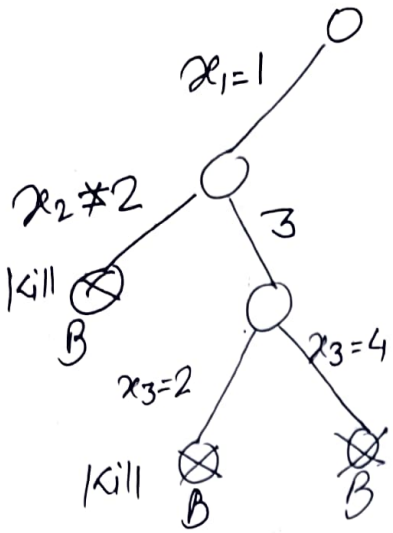
State space tree (without considering attack)



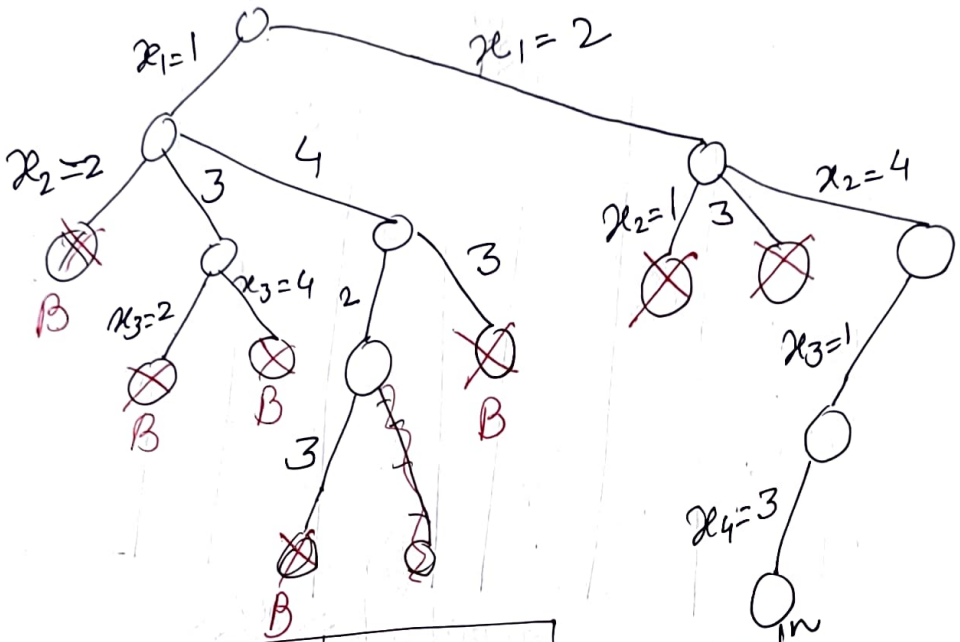
$$1 + 4 + 4\times3 + 4\times3\times2 + 4\times3\times2\times1$$
$$= 1 + 4 + 12 + 24 + 24 = 65$$ (Max^m no of nodes

Bounding fun^n = queens should not be in same row, same col^m & same digonal.

Bounding fun^n = row, col^m, digonal

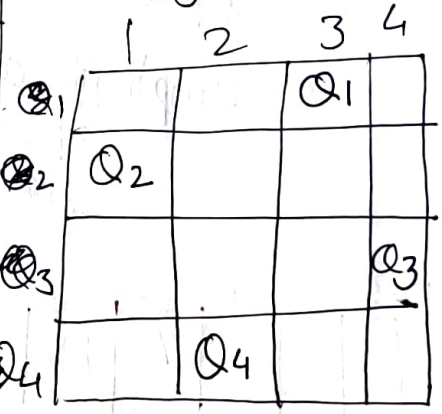


No place for queen 3 so move second queen

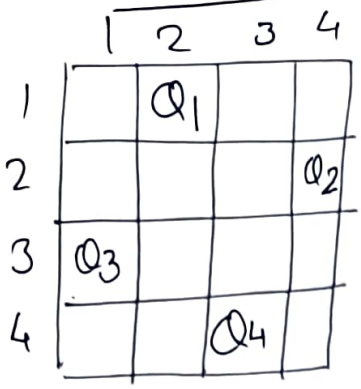


Soln

Q_2	Q_4	Q_1	Q_3
2	4	1	3
~~Q_1~~ col 1	~~Q_2~~ col 2	~~Q_3~~ col 3	~~Q_4~~ col 4

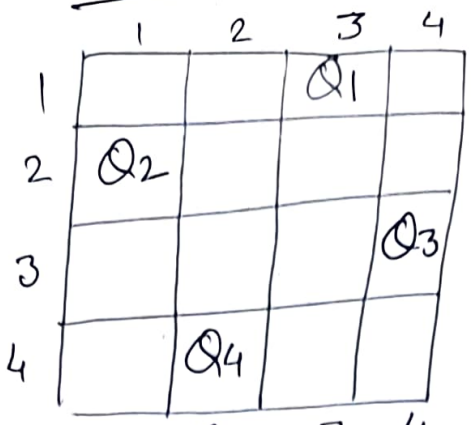


Soln 1



1	2	3	4
2	4	1	3

Soln 2 mirror image of Soln 1



1	2	3	4
3	1	4	2

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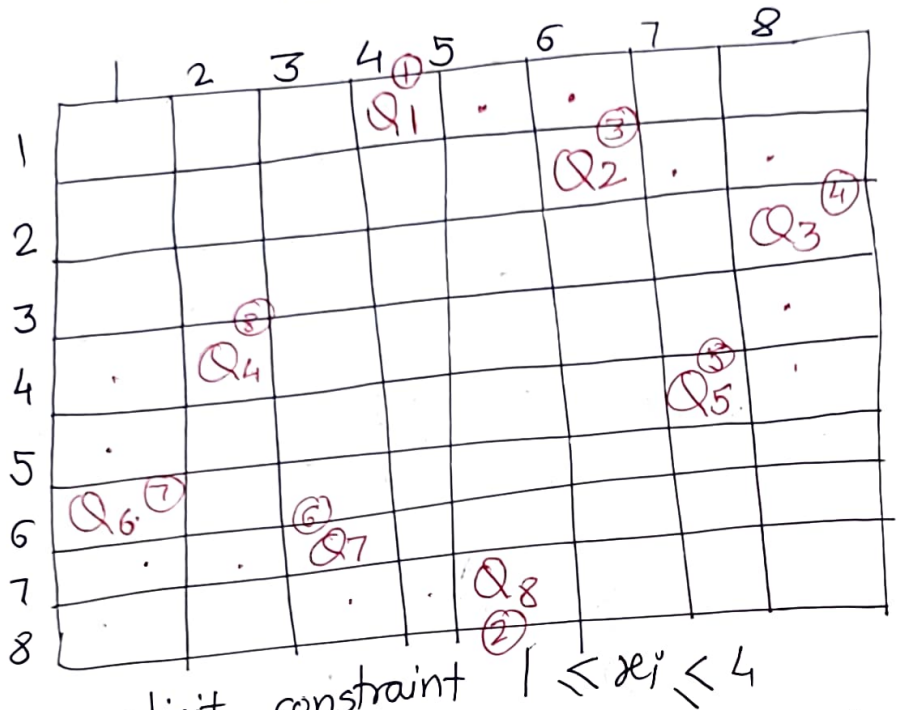
8 queen problem



explicit constraint $1 \leq x_i \leq 4$

Implicit constraint — No 2 x_i can be same
or
all queens must be placed on different columns
— No 2 queens can be on the same diagonal

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