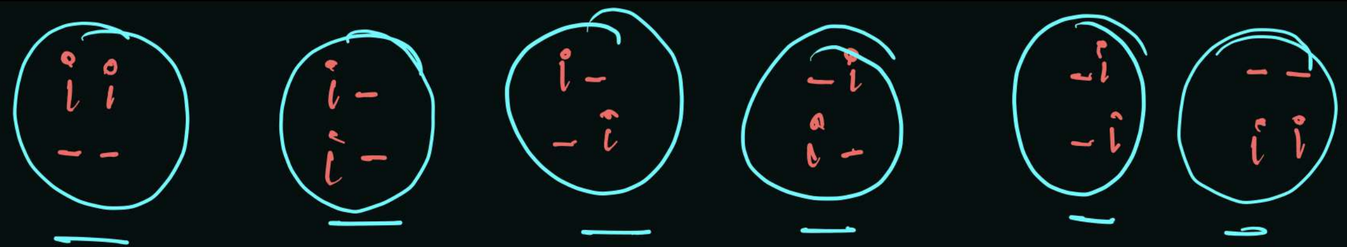
Queens Combinations - 2D as 1D - Queens Chooses

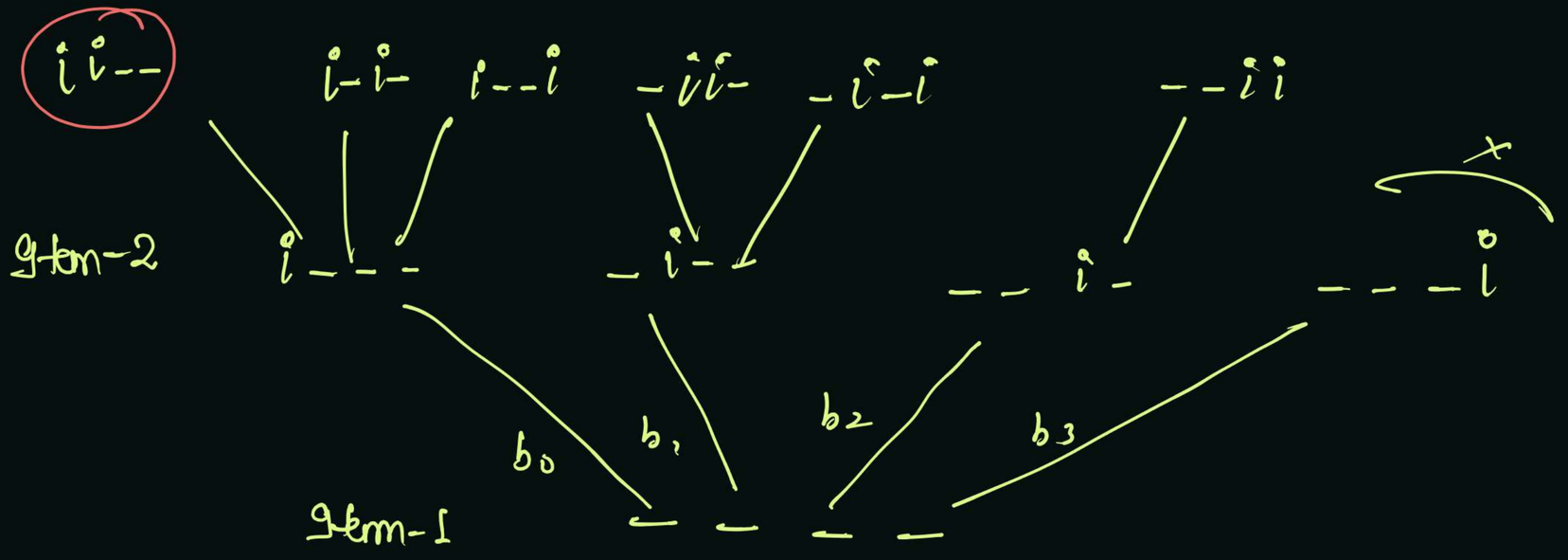
Thursday, 15 July 2021 7:16 PM

level → 4items

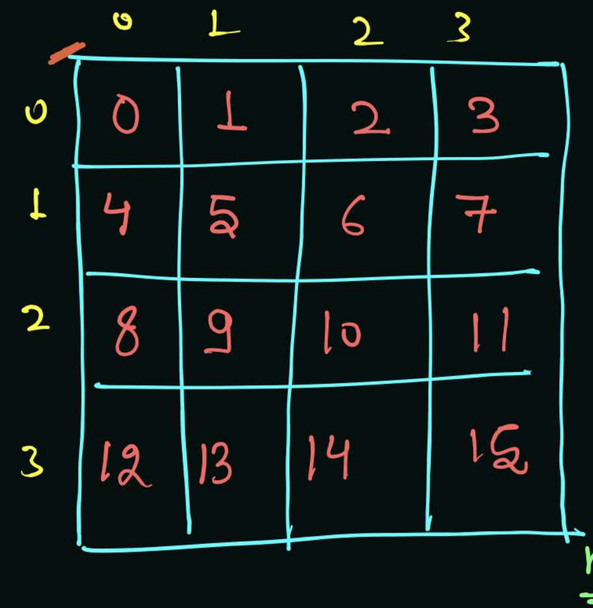
options → boxes



$^4C_2 = \frac{4!}{2!2!} = 6$



Traversal in 2D matrix



Cell → 0 to (m x n - 1)

mxn

0 to row → 0 to Col

(0,0) 0	(0,1) 1	(0,2) 2	(0,3) 3
(1,0) 4	(1,1) 5	(1,2) 6	(1,3) 7
(2,0) 8	(2,1) 9	(2,2) 10	(2,3) 11
(3,0) 12	(3,1) 13	(3,2) 14	(3,3) 15

Conversion from b.no. to row and Col →

$$r = \frac{\text{b.no.}}{\text{Total Row}}$$

$$c = \text{b.no.} \% \text{ Total Col}$$

$\frac{11}{4} = 2$

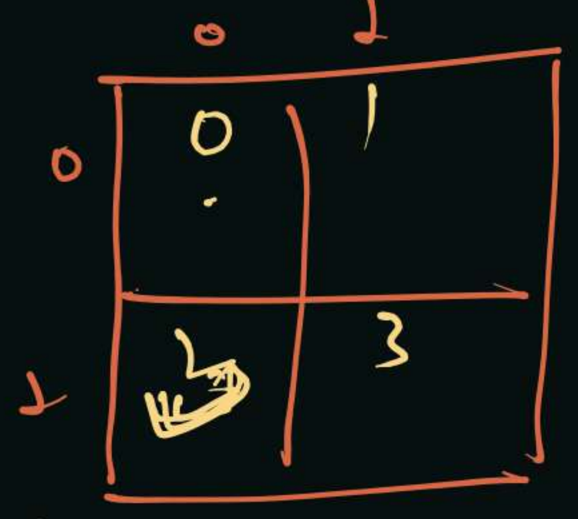
11 % 4 = 3

(2,3) ← 11 ← (2,3)

(2,1) → 9

row No. → $\frac{\text{cell no.}}{m}$

Col. No. → (cell no.) % n



$^4C_2 \rightarrow$ [q q / – –] [q – / q –] [q – / – q] [– q / q –] [– q / – q] [– – / q q]

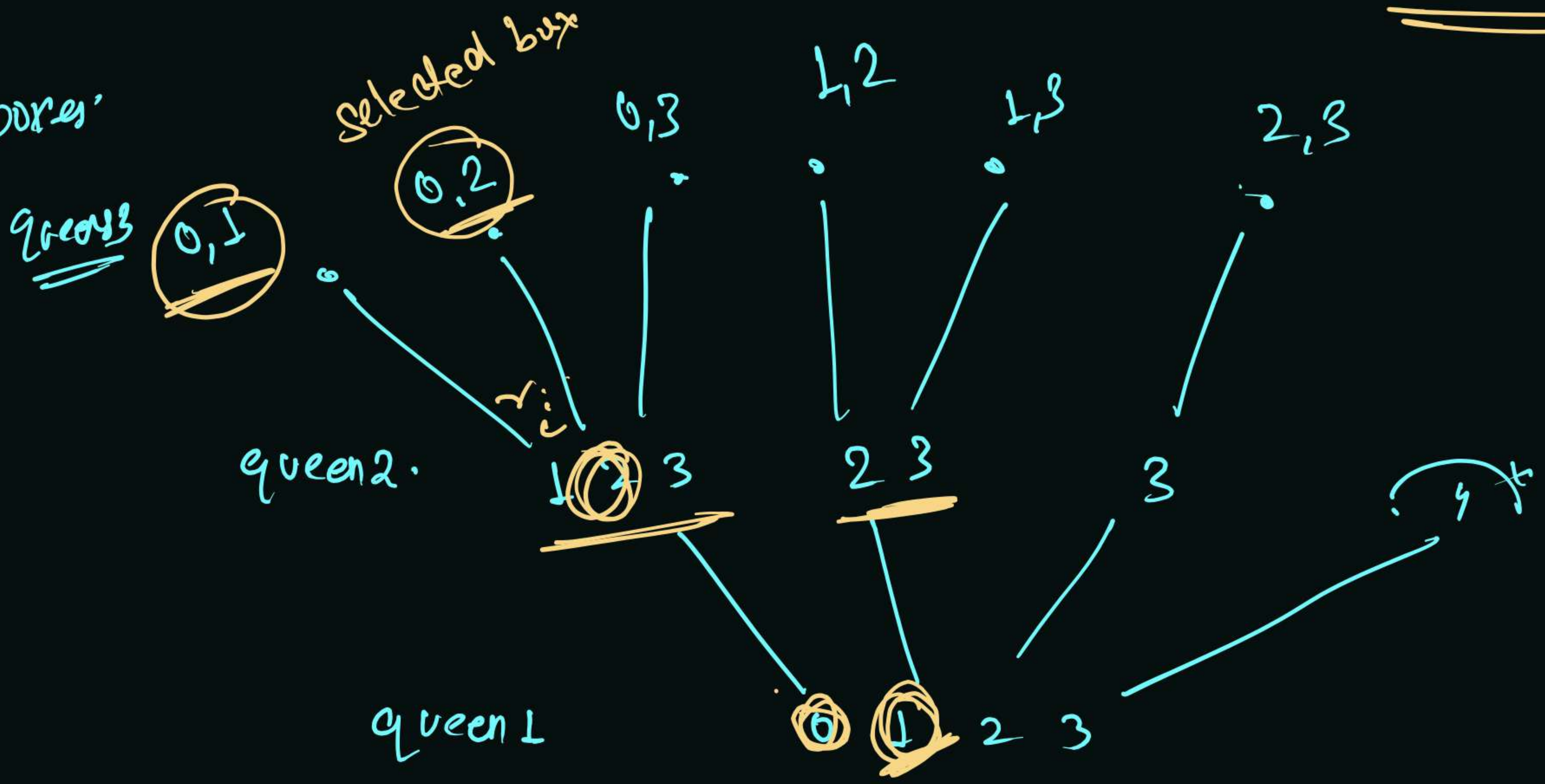
selected box → (0,1) (0,2) (0,3) (1,2) (1,3) (2,3)

$^{n\times n}C_n \rightarrow$ All arrangement of n queens in n×n boxes.

↑ Identical

level → queens.

option → boxes.



b = lb+1 to n×n−1

↳ argument of Recursion

lb = −1

- 2D matrix of box
- b. no.
- current queen
- total queen

$r = \frac{bno.}{total\ Row}$

c = bno % total Col.

NQueens Combinations - 2D as 1D - Queens Chooses

Thursday, 15 July 2021 7:15 PM

level → queen.

option → boxes.

box → 4x4.

queen → 4

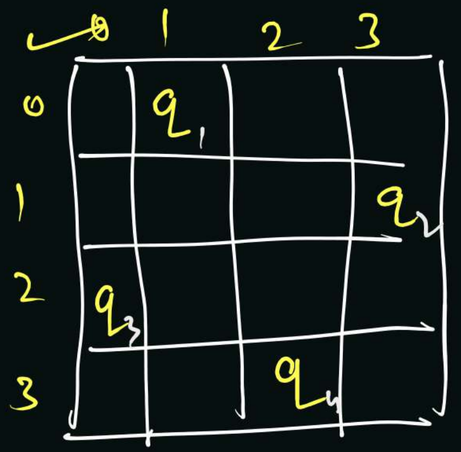
Safety of queen also concern of problem.

place → is safe to place

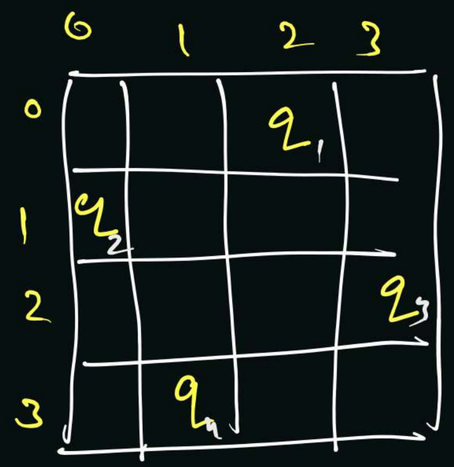
Total combination → $^{16}C_4 = \frac{16 \times 15 \times 14 \times 13 \times 12!}{4! \times 12!}$

$= \frac{2 \quad 5}{4 \times 14 \times 13 \times 10}$

$= 1820$ → final Result with safety concern



(0,1) → (1,3) → (2,0) → (3,2)

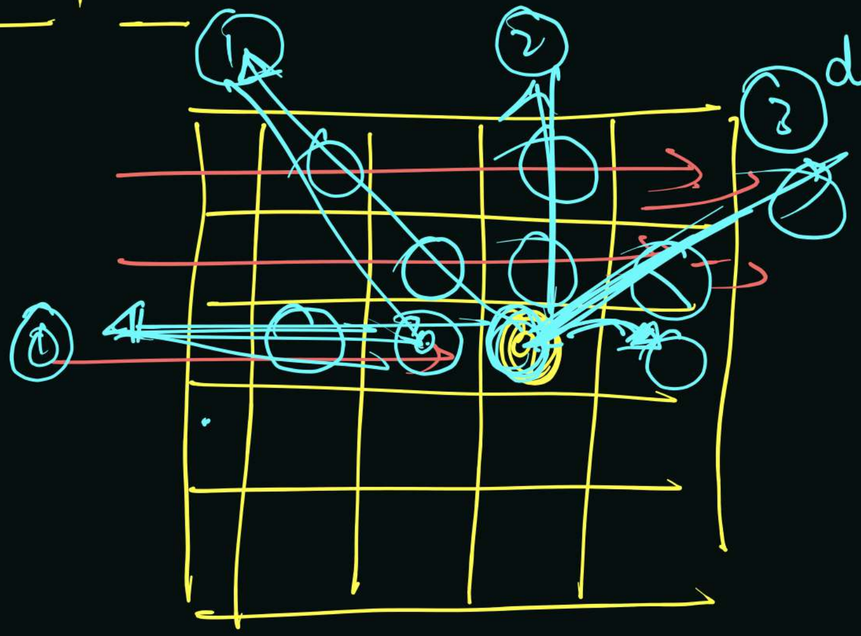


(0,2) → (1,0) → (2,3) → (3,1)

↳ (2)

NOTE: To find box No → b.no = r * TotalRow + C

Is Safe to place. →



(r, c)

r, c

Direction → 0
r → same
col → decrement until → 0

Direction → 1
row → decrement
col → decrement
] until both are valid

Direction → 3
row → decrement] until 0
col → same] until chess.length.

Direction → 2
row → decrement] until → 0
col → same

NQueens Permutations - 2D as 1D - Queens Chooses

Thursday, 15 July 2021 7:16 PM

$^3P_2 = \frac{3!}{1!} = 3 \times 2 = 6$

3 place

2 item

level → items

options → boxes

n×n → box

n → items.

$^{n \times n}P_n$.

^nP_r.

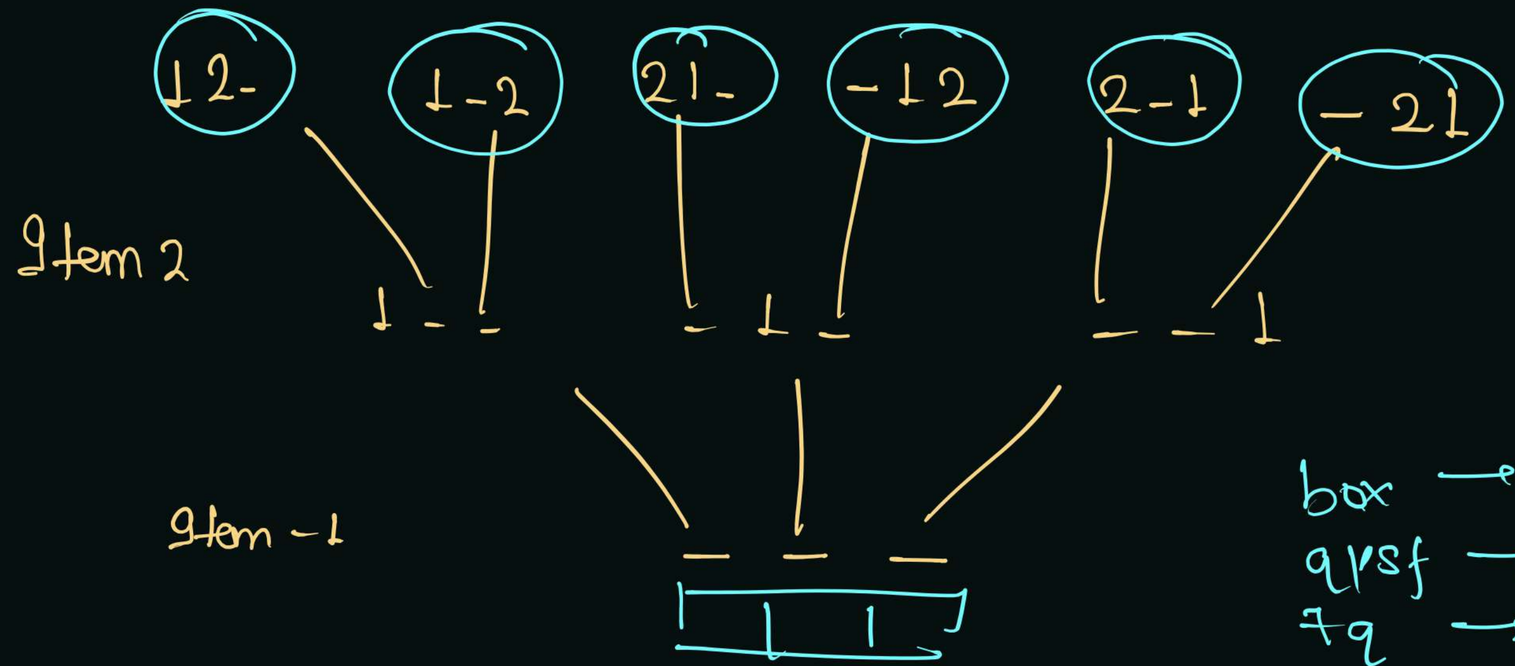
16 → box

4 → queen

$^{16}P_4 = 16 \times 15 \times 14 \times 13$

↓ arrangement

isQueenSafe → valid answer.



box → 2D.

qrsf →

+q →

1 2 0

1 0 2

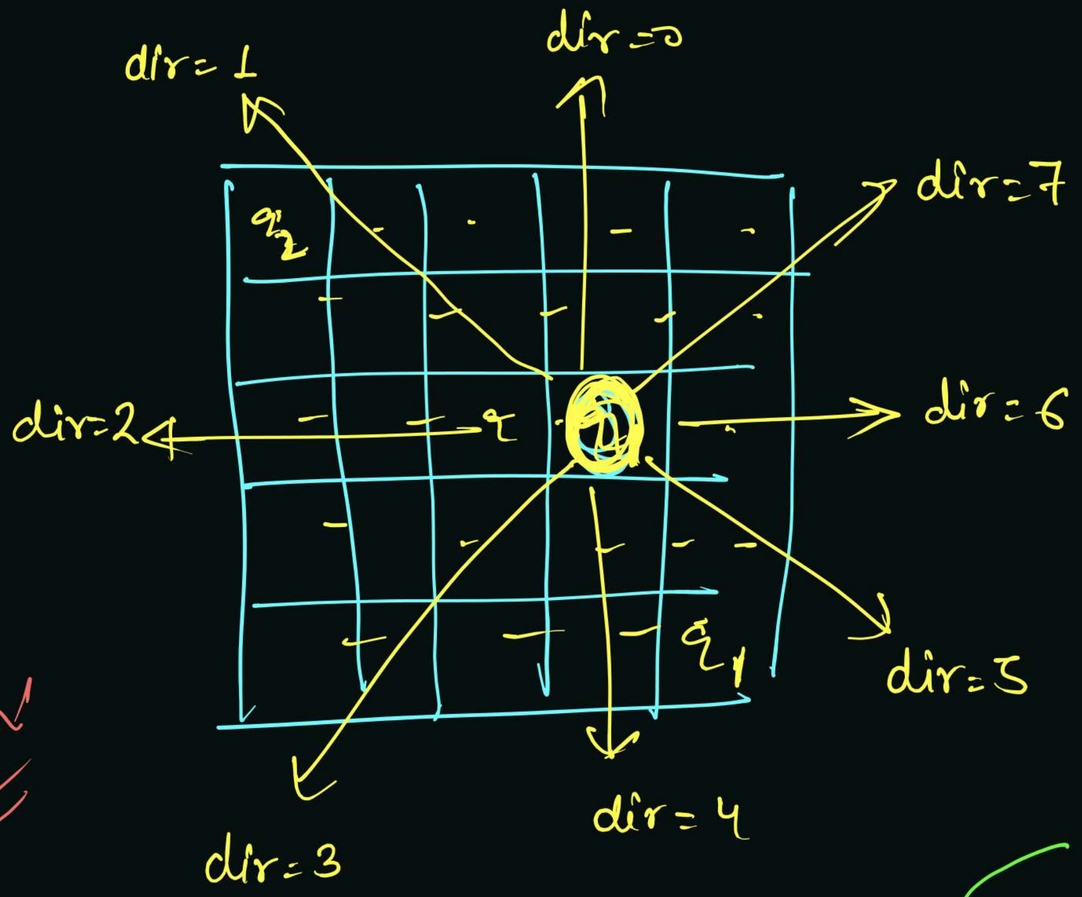
2 1 0

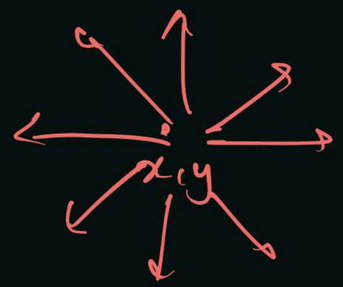
2 0 1

0 1 2

0 2 1

Direction of checking the safety of queen





check safety of queens in all direction

why? → we are finding permutation.

↳ on Every call, we are starting our loop from beginning position.

8 × 8.

K		K		K		K	
	K		K		K		K
K		K		K		K	
	K		K		K		K
K		K		K		K	
	K		K		K		K
K		K		K		K	
	K		K		K		K

Max. knights we can place on chess board

NKnights Combination- 2D as 1D - Knights Chooses

Thursday, 15 July 2021 7:16 PM

nxn → chessboard , n- Identical knights,
print all possible arragments to place n- knights.

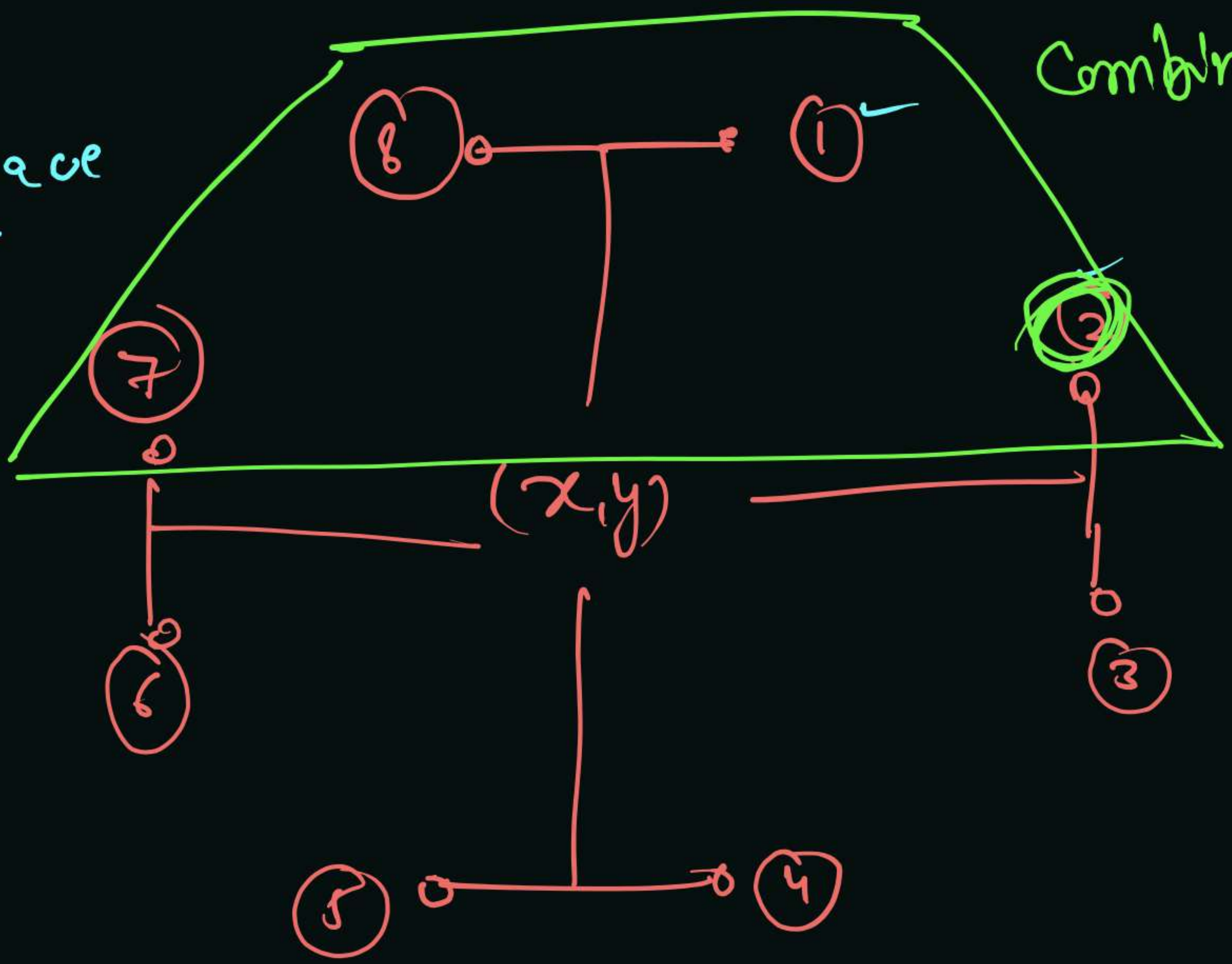
→ last box] combination/k

Level → knights
option → box

Is Safe to place

for Comb →

$x-2, y+1$
$x-1, y+2$
$x-1, y-2$
$x-2, y-1$



Combinations

1. $x-2, y+1$ ✓
2. $x-1, y+2$ ✓
3. $x+1, y+2$
4. $x+2, y+1$
5. $x+2, y-1$
6. $x+1, y-2$
7. $x-1, y-2$ ✓
8. $x-2, y-1$ ✓