N Queens' Problem

N - number of Queens i.e 1,2,3,4,..

These queens will be upset if they face each other.

- No queen's place should in the same row
- No queen s place should be in the same column.
- No queen's place should be in the same diagonal

n = 1

Queen 1

Q1

solution → Q1

1

---

n = 2

queen 1

queen 2

Q1	2
2	2

n×n

2×2

No solution

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n = 3

queen 1

queen 2

queen 3

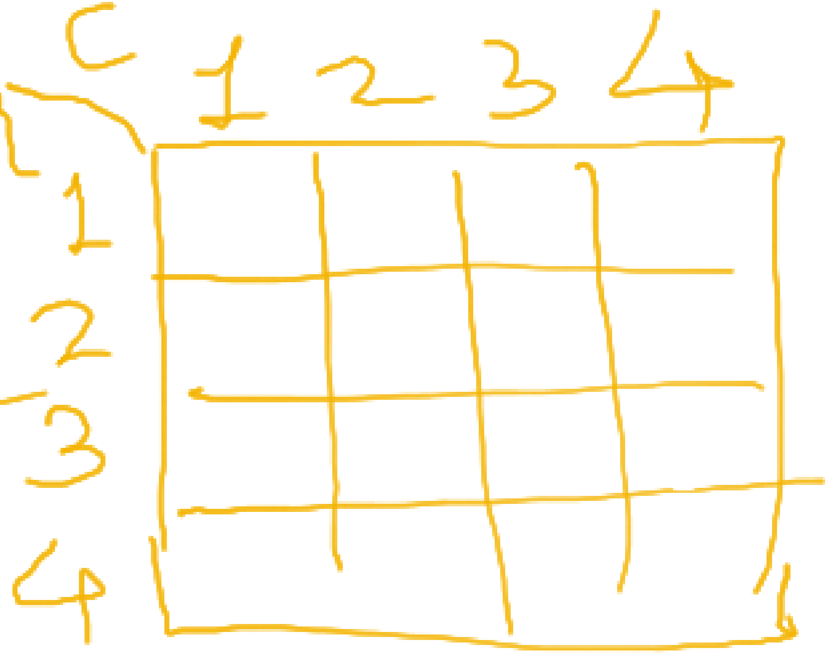
Q1		
2	2	Q2

3×3

? No solution

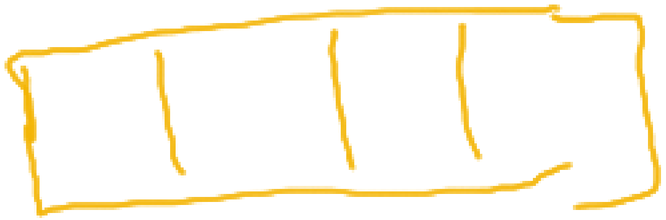
$n = 4$

Assume



Solution Q locations for all the Queens

Output →



Store column number where the individual queen is gonna be placed.

$n = 4$, 2 solutions

$n = 5$, 10 solutions

(Assignment math (connection))

Now we can look at How will we decide

(1) row

(2) colm

(3) diagonal

logical checks

Place n=4 queens

for (i=1 i<=n i++)

place queen i ← complex constraints satisfied

If soln is available display and continue finding next.

(A) any one soln

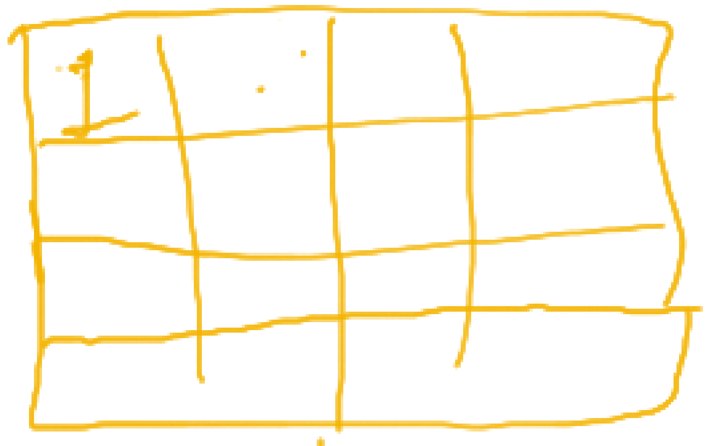
(B) All

else display message soln not possible

P(1)

n=4

Q.1



row concern can be taken care while placing the queen

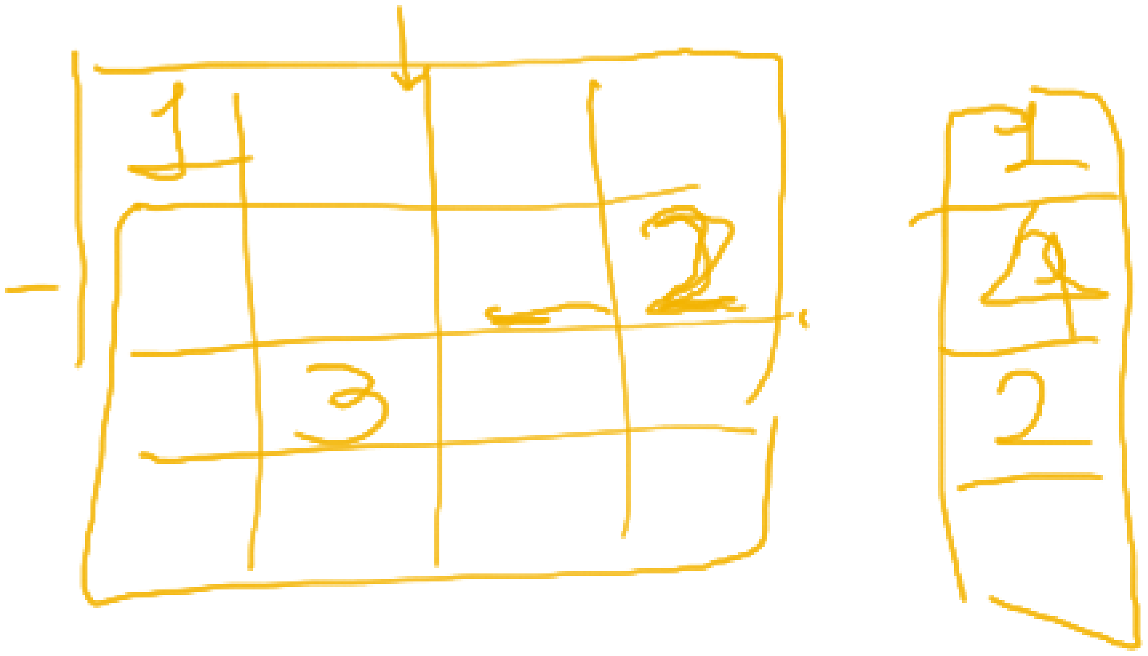
Q Skip/Jump to next row before placing another queen.

Q2

Q.3

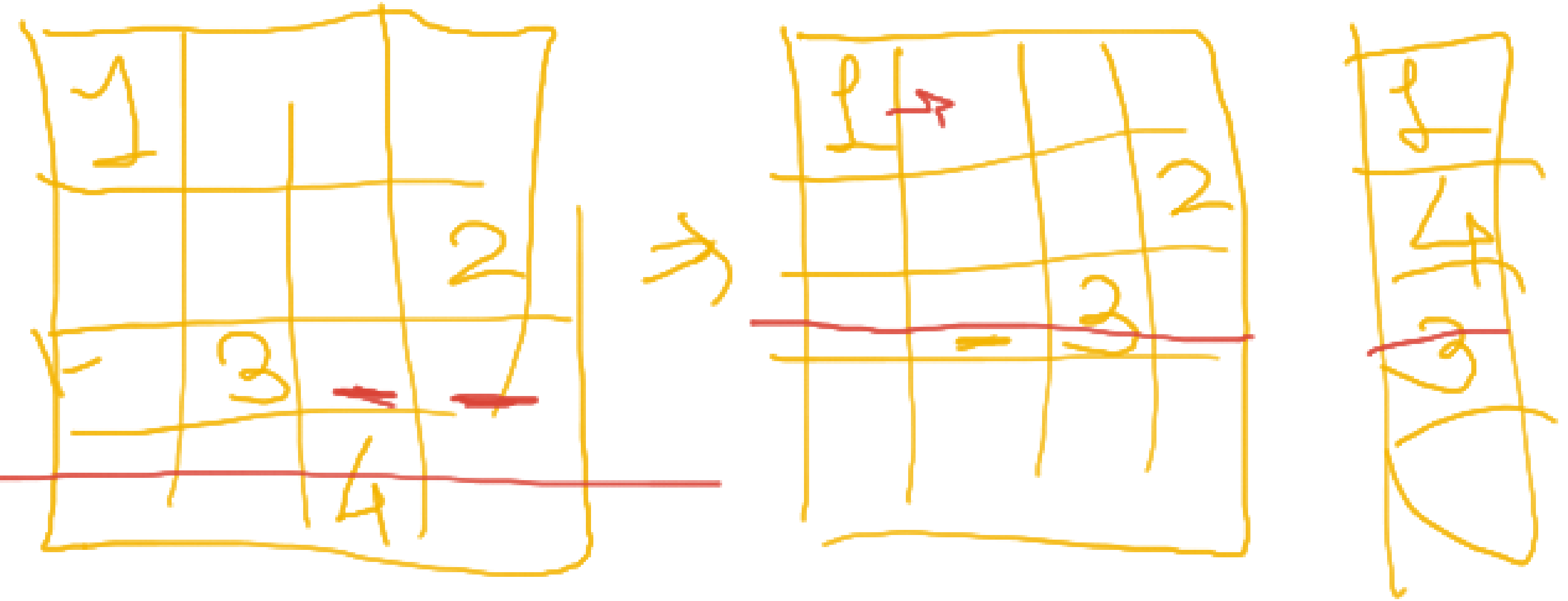
1 (1,1)
2 (2,3)
3 (3,)
4 (4,)

Q3

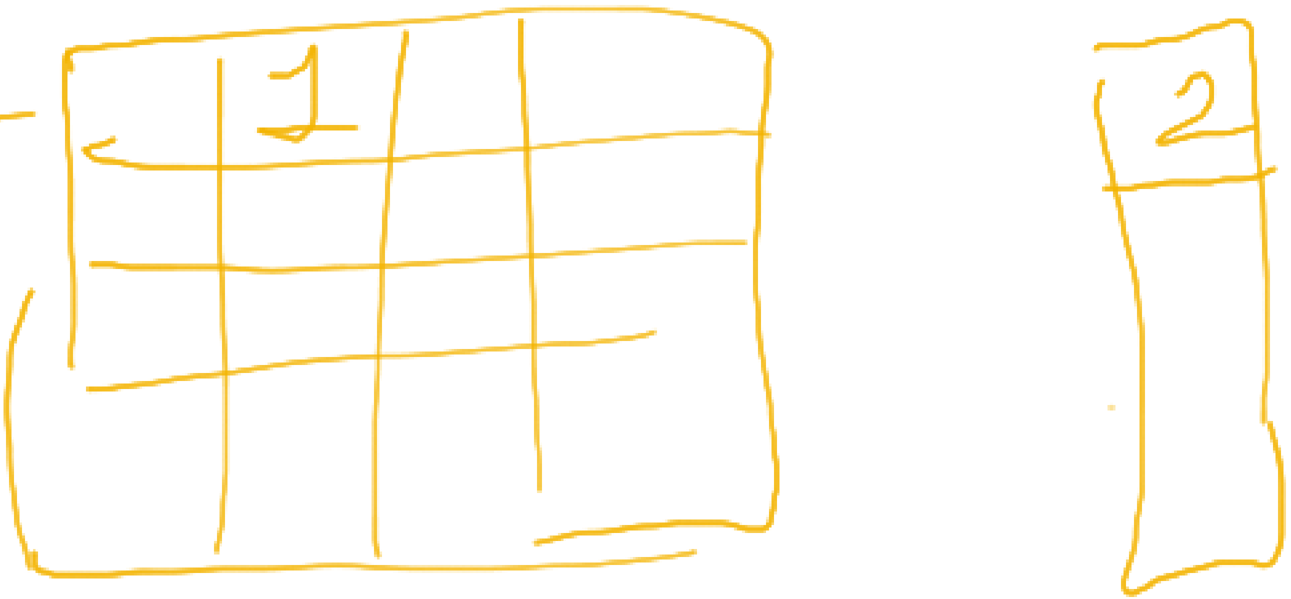


Q4

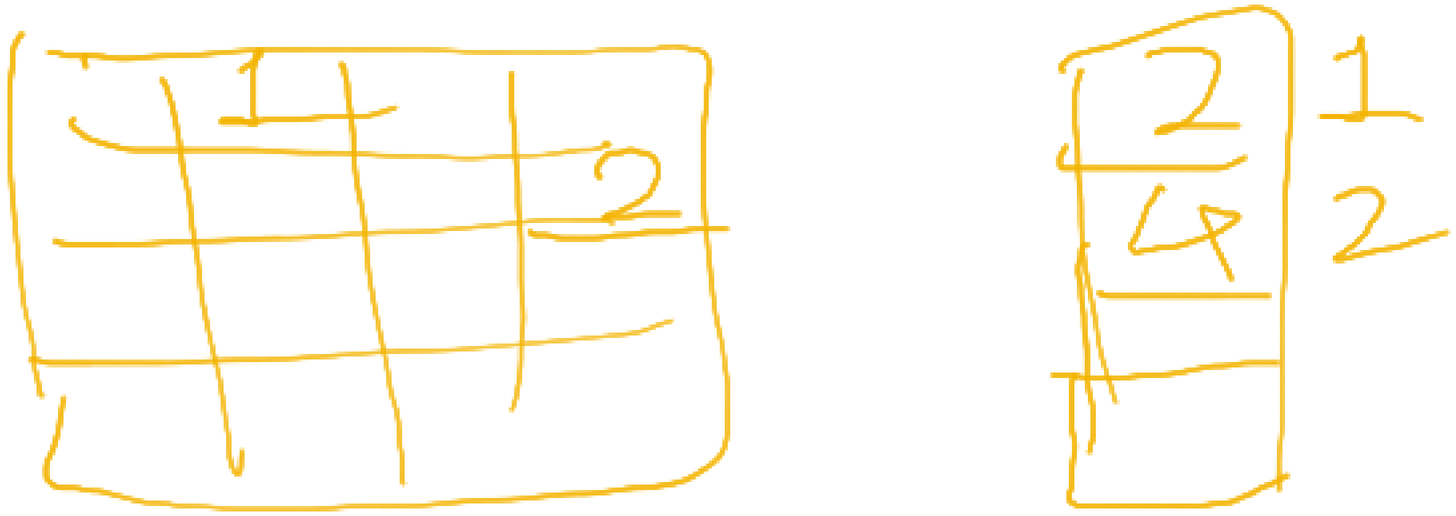
Q.4



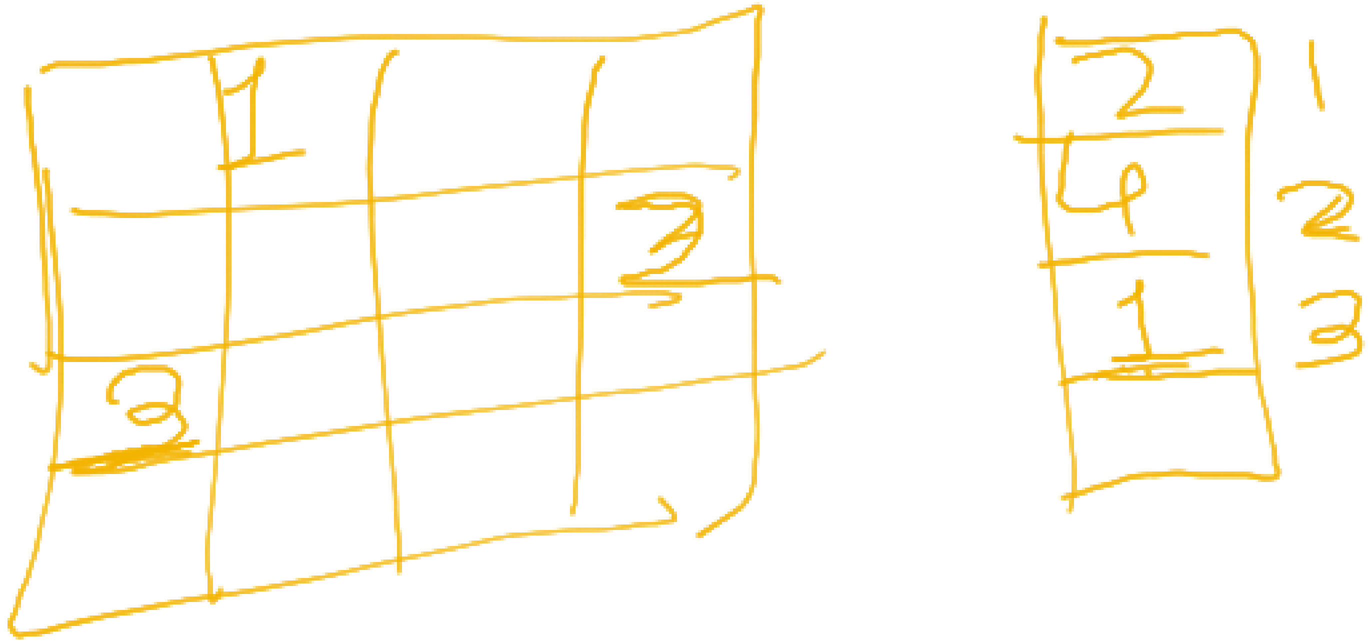
Q1



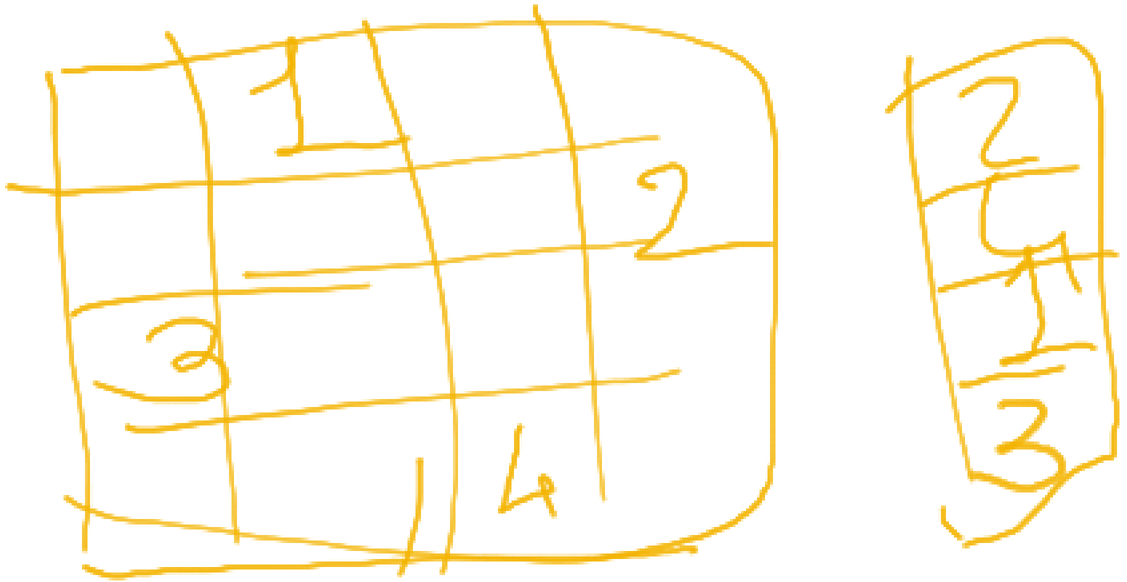
Q2



Q3



Q4

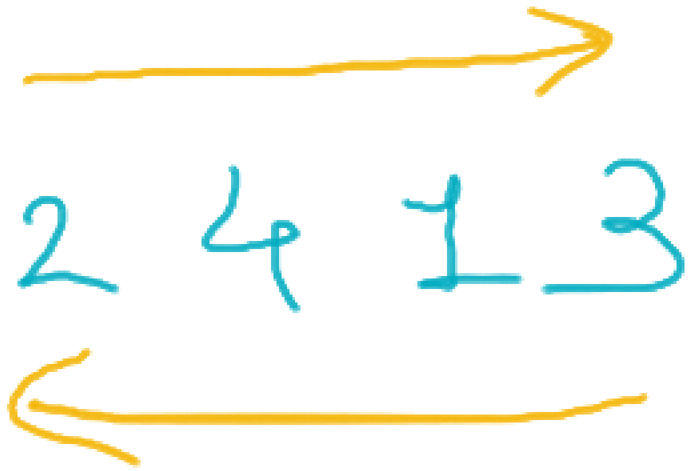


Solution #1

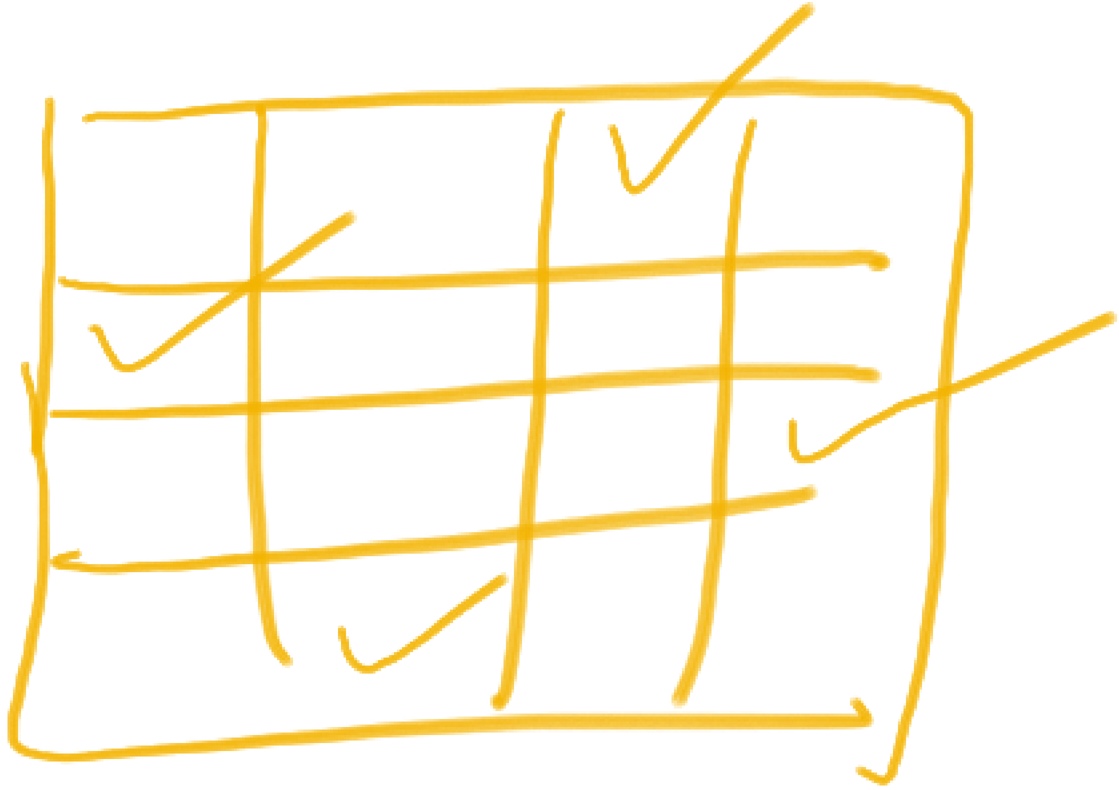
Yes

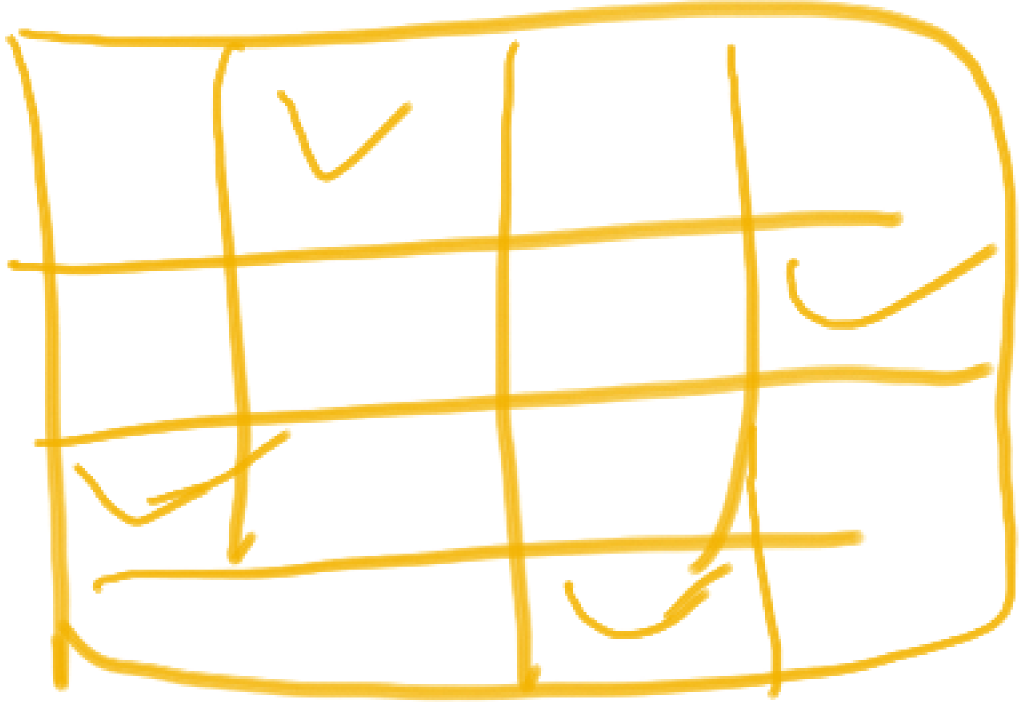
$n=4$

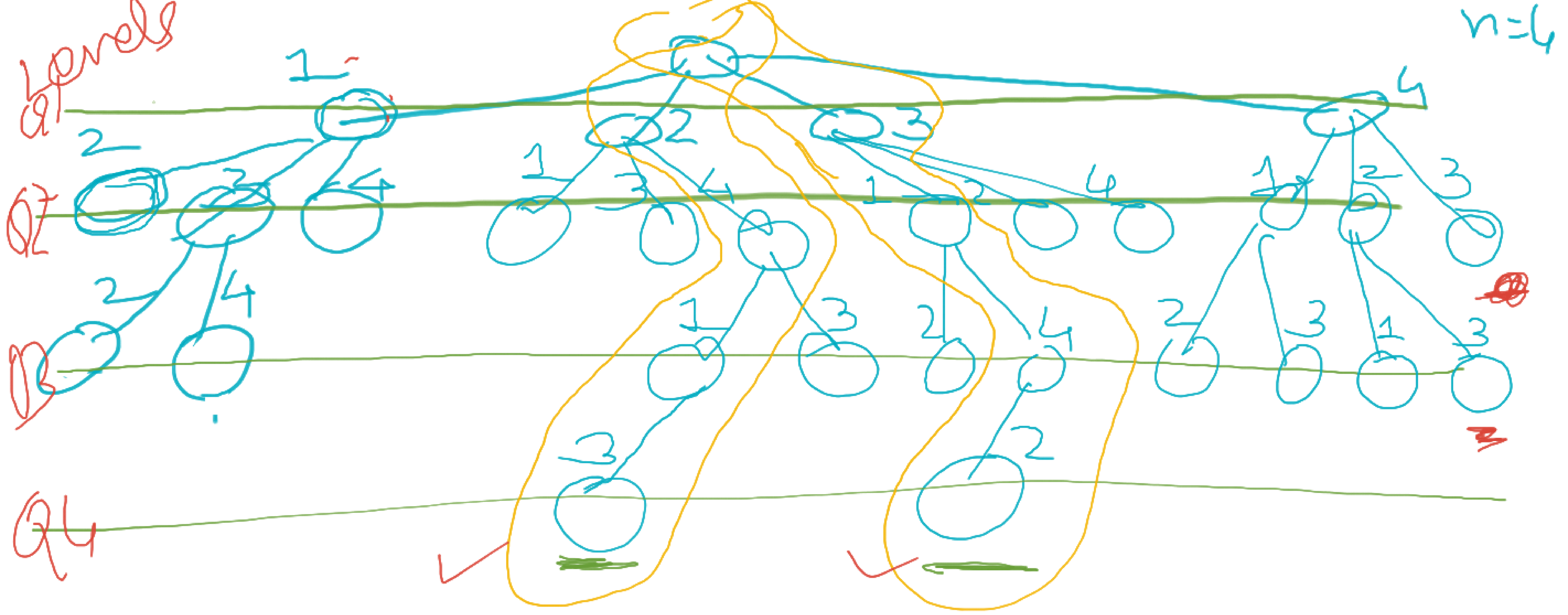
2
4
1
3



$3\ 1\ 4\ 2 \longleftrightarrow 2\ 4\ 1\ 3$







2 4 1 3 3 1 4 2

Levels indicate queen no

may need to keep flag counter of sol^n ⇒ No soln

Assignment:

1) Think of algorithm and data structures to solve nQueen

2) Do paperwork for n=4, n=5 to with indexes and rows, columns specified and try to find any maths logic to decide on diagonal cross.

3) Are there any formula to know how many solutions will be, if any, for n?

- To solve this problem do we really need the n x n maze memory?

- If understanding maze indices start row ← 1, column ← 1 instead of actual array 0, may do so.