

Missing number

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size of n , $[0, n] \rightarrow$ one value is missing.

$$5 \quad [0, 3, 2, 1, 5]$$

$$\text{ans} = \underline{\underline{4}}$$

$$3 \quad [3, 1, 2] \quad \text{ans} = 0$$

$$4 \quad [1, 3, 0, 2] \quad \text{ans} = \underline{\underline{4}}$$

sum of n natural numbers:-

$$n \times (n+1) / 2$$

$$4 \times (4+1) / 2$$

$$[1, 3, 0, 2]$$

10

$$\text{arraySum} = 0 + 1 + 3 + 0 + 2 = 6$$

$$\text{totalSum} - \text{arraySum}$$

$$10 - 6 = \underline{\underline{4}}$$

$$\Rightarrow \text{ans} = \underline{\underline{3}}$$

5

[4, 1, 0, 5, 2]

arraysum = 12

$n \times (n+1)/2$

$5 \times (6)/2$

15

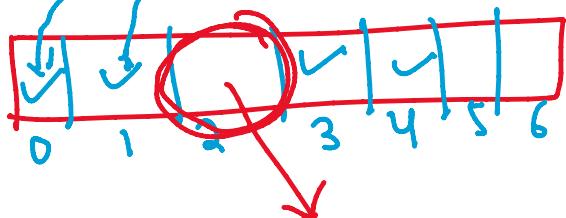
totalSum - arraysum

$15 - 12 = \underline{\underline{3}}$

first missing positive

(0, -3, -1, 1, 4, 3)

ans = 2



(N)

5

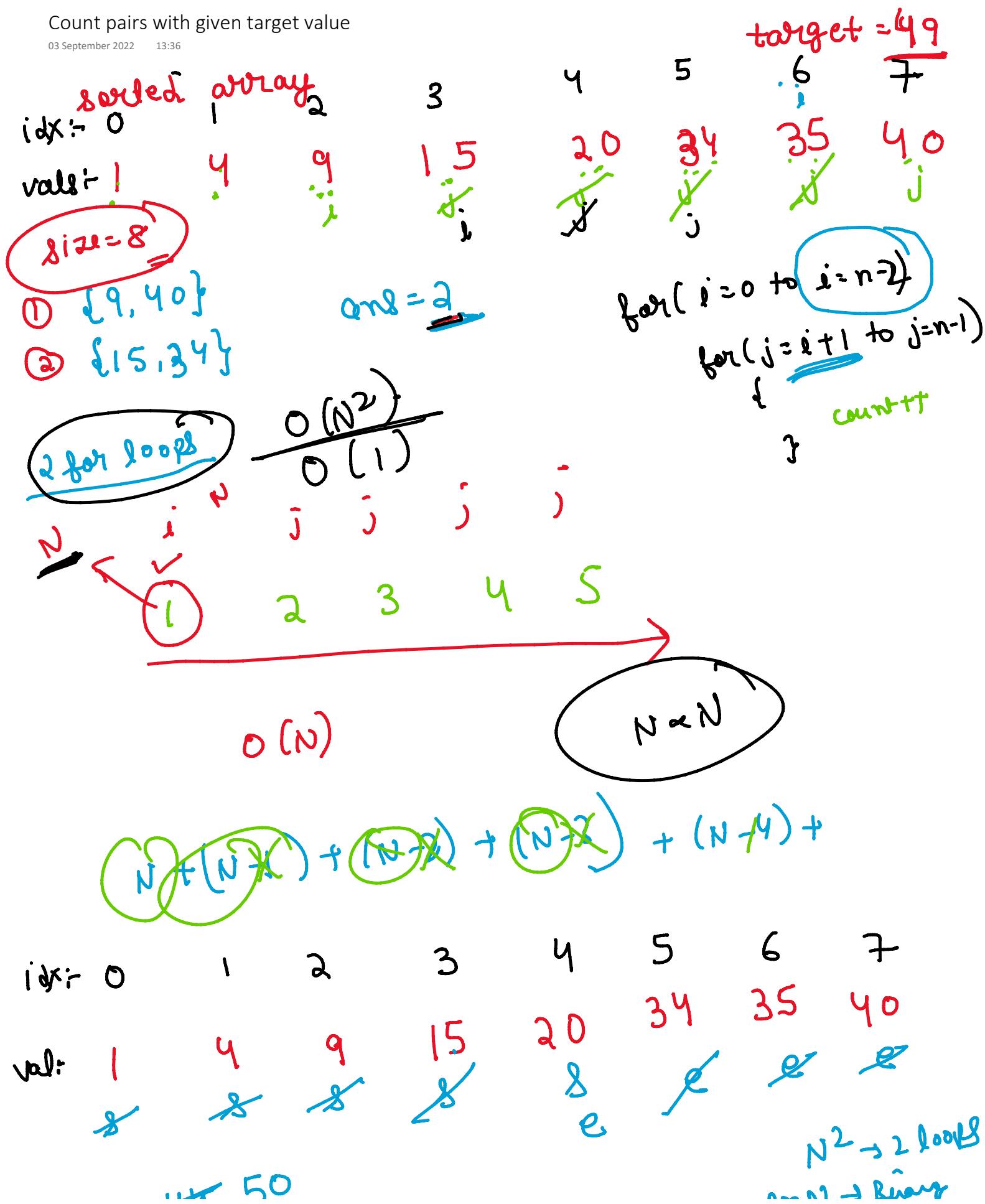
0 4 3 5 1

→ ans = 2

$\frac{O(N)}{O(1)}$ → time
space

Count pairs with given target value

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~~42 44~~ 50
target = 49
~~9 40~~

Count = ~~p + l~~
~~p x 2~~ = .

$N \leftarrow 2^{100}$
 $N \log N \rightarrow \text{Binary}$
 $(N, \frac{N}{1}) \rightarrow \text{Hashmap}$
 $\Rightarrow \text{two pointers}$
 $s = e \parallel s > e$

when array is sorted
Binary search
Two pointers

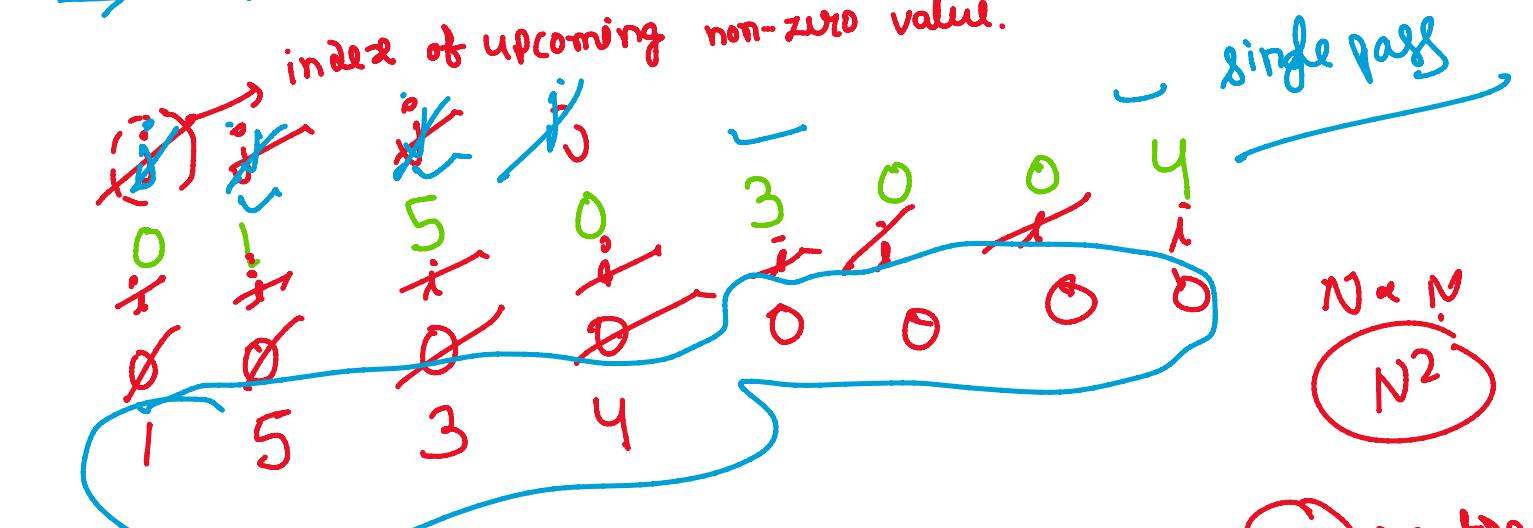
Move zeros to end of array

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- move zeros to end of the array
- without disturbing the relative ordering of non-zero elements.

$$\begin{array}{ccccccc} 0 & 1 & 2 & 0 & 5 & 0 \\ \rightarrow & 1 & 2 & 5 & 0 & 0 & 0 \end{array}$$

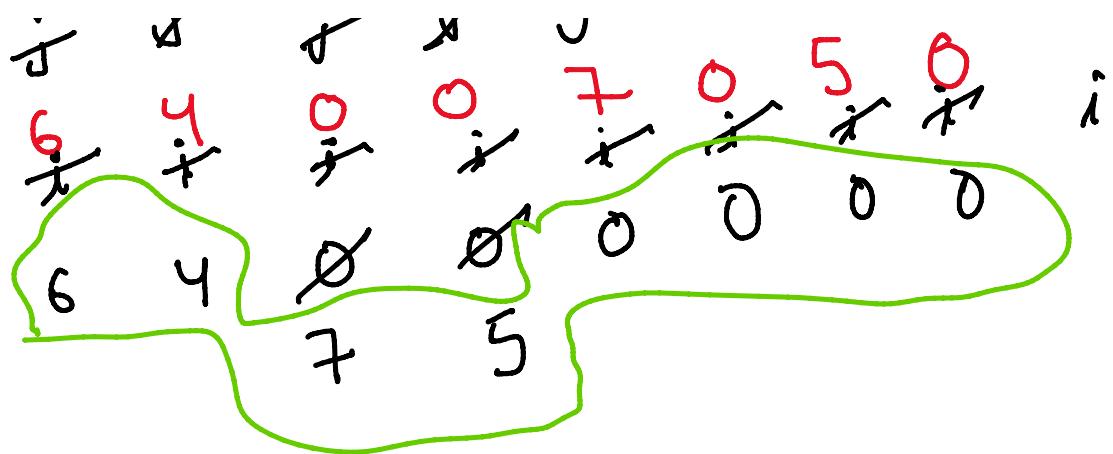
$$\begin{array}{ccccccc} 1 & 5 & 0 & 3 & 0 & 0 & 4 \\ \rightarrow & 1 & 5 & 3 & 4 & 0 & 0 & 0 \end{array}$$



swap in case of non-zero-

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

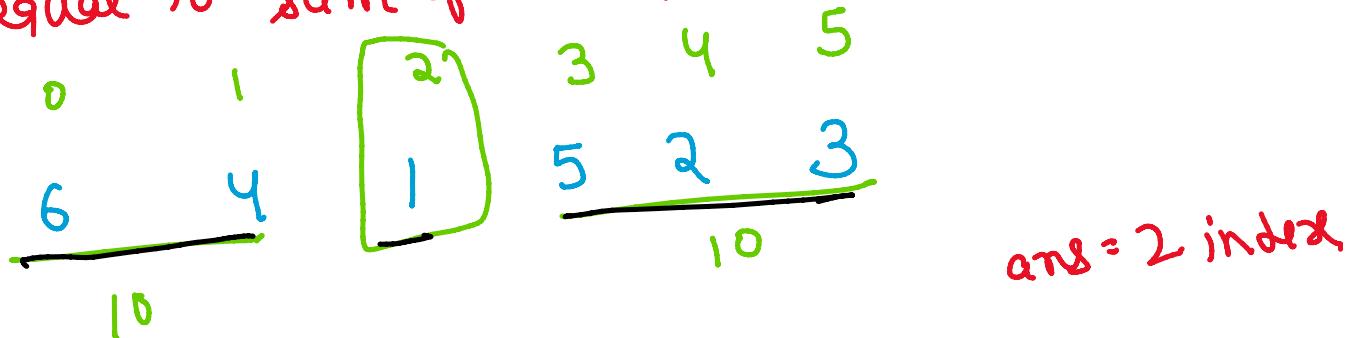
j i j i j i j $0, 5, 0$ i



Pivot index

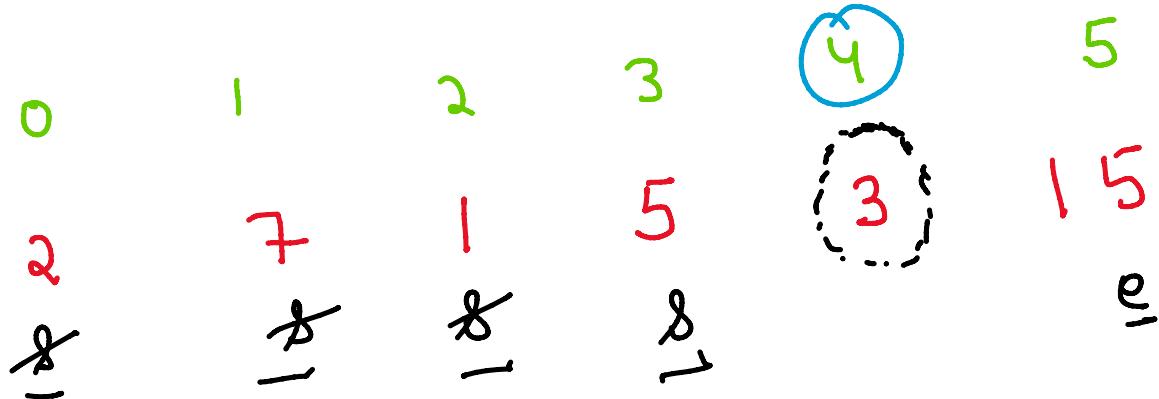
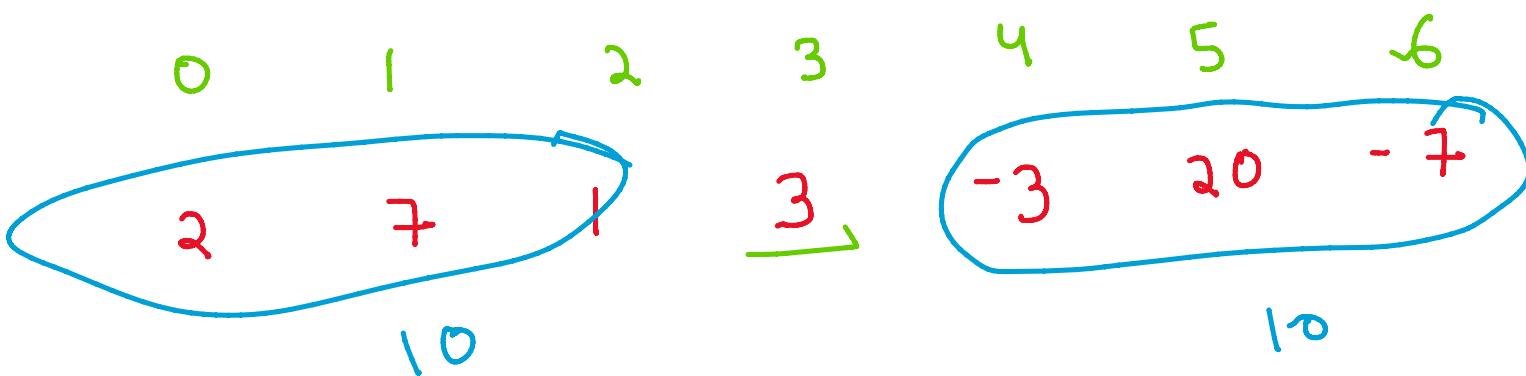
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where sum of all values in left of that index will be equal to sum of all values in right.

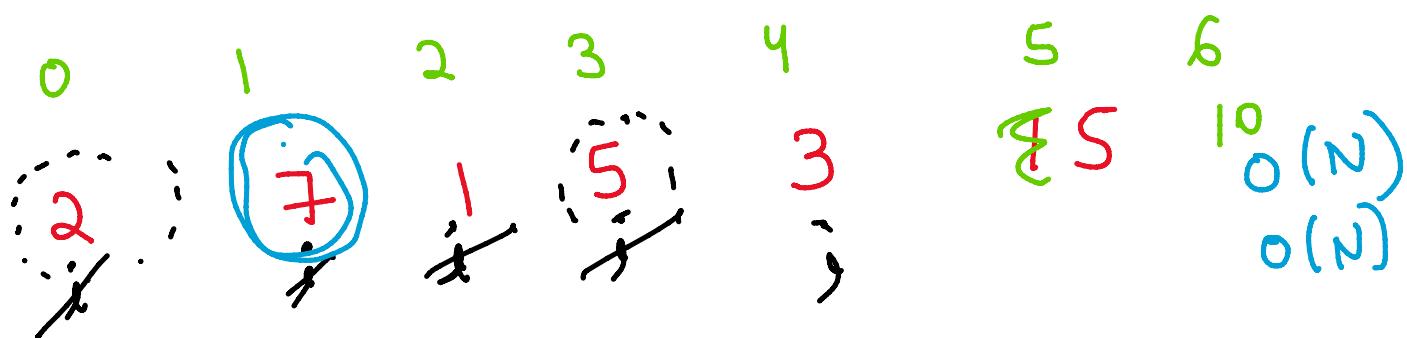
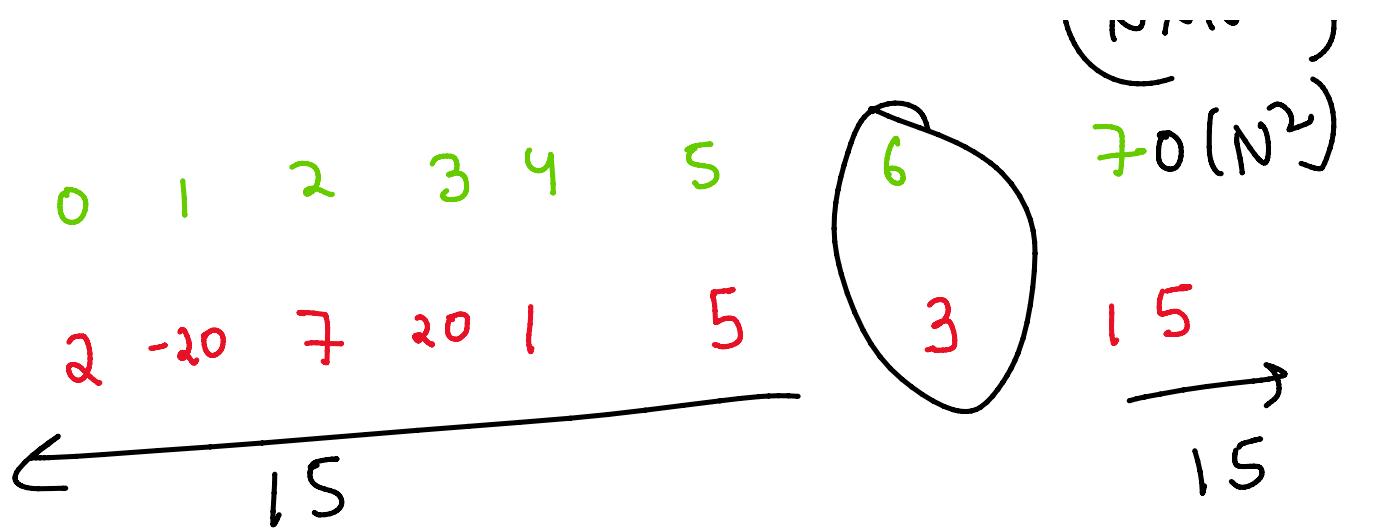


6 4 1 4 2 3

ans = -1



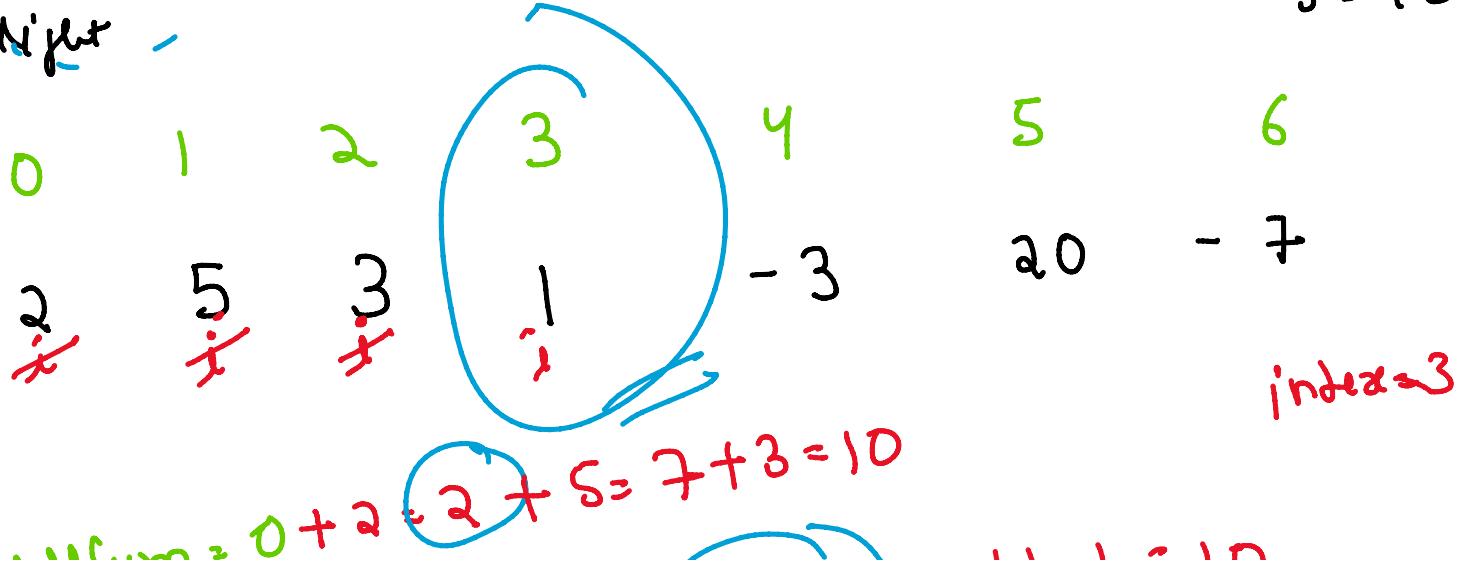
$(N \times N)$



$$\text{leftSum} = 2 + 7 = 9 + 1 = 10 + 5 = 15$$

$$\text{totalSum} = 33 - 2 = \underline{31} - 7 = 24 - 1 = 23 - 5 = 18 - 3 = 15$$

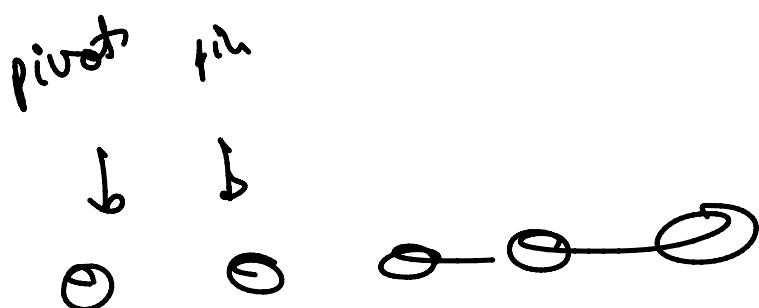
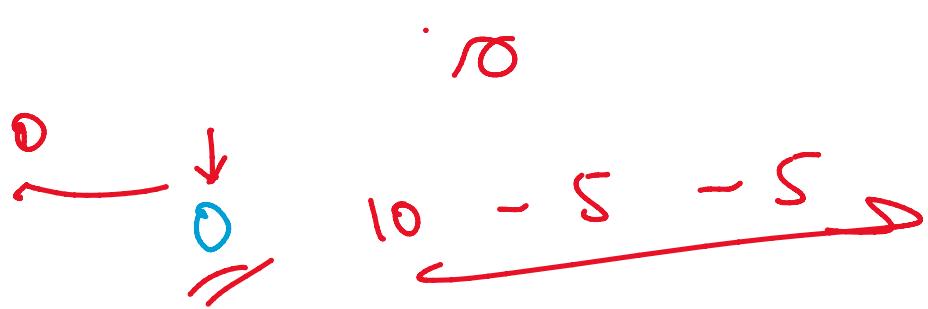
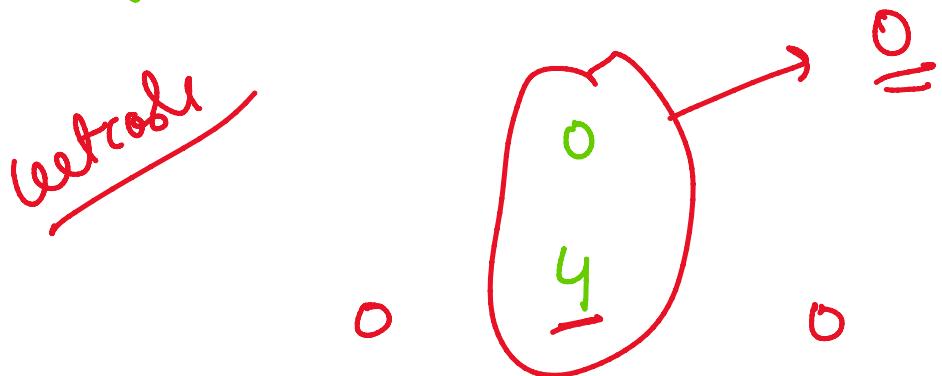
Right -



$$\text{leftSum} = 0 + 2 + 2 + 5 = 7$$

$$\text{totalSum} = 21 - 2 = 19 - 5 = 14 - 3 = 11 - 1 = 10$$

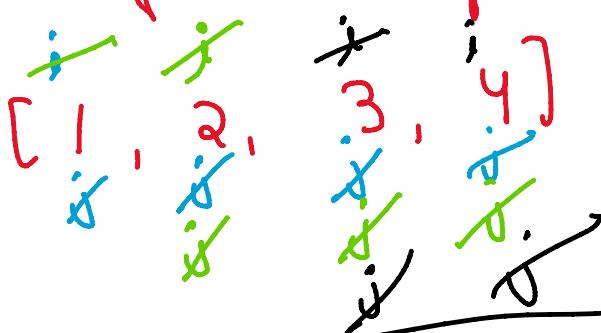
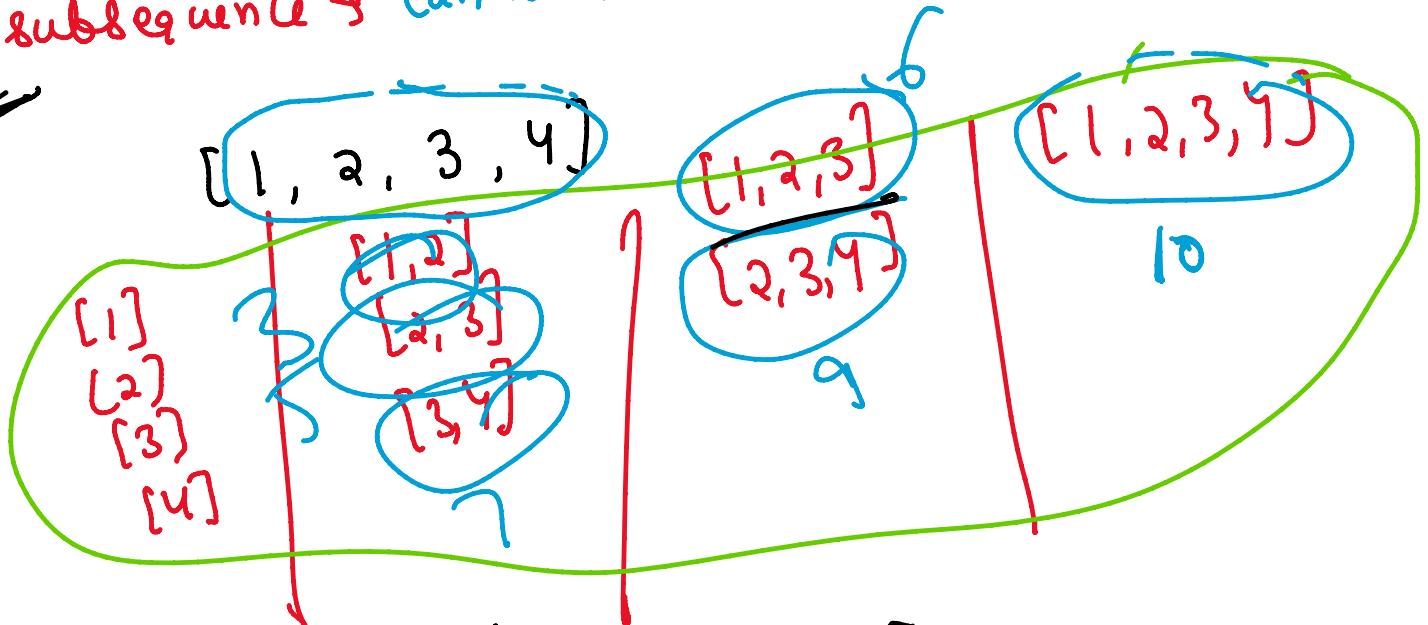
right



Generate all subarrays

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subarray → Continuous, cannot skip elements
subsequence → can skip



for($i=0$ to $n-1$)
 for($j=i$ to $n-1$)

// pointing
 for($k=i$ to j)

[1], [1, 2], [1, 2, 3], [1, 2, 3, 4]
[2], [2, 3], [2, 3, 4]
[3], [3, 4]
[4]

N^3

→ find maximum subarray, sum

16
=

2 -5 7 -6 5 4 -10

3 4 -8 2 5 1 -3 4

91
=

for ($i=0$ to $n-1$)
for ($j=i$ to $n-1$)
 \times

i i
2 -5 7 -6 5 4 -10
 j j j j

currsum = 0 \neq 2 4

maxsum = 0 2

N^2
↓
 N