

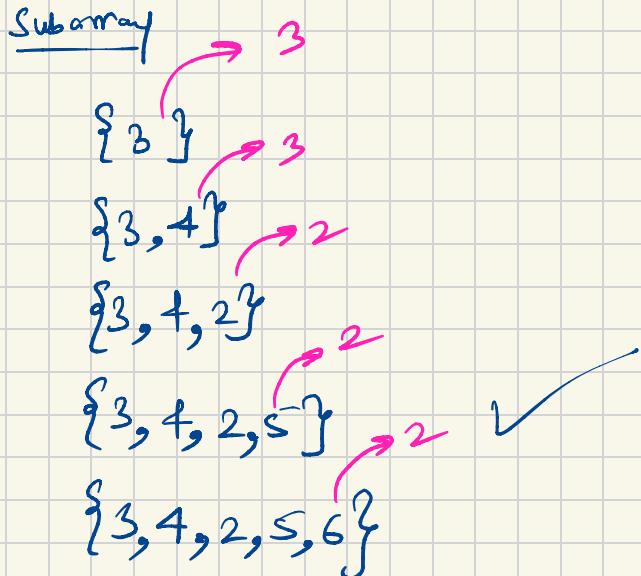


Agenda

- o Sum of Subarray minimums
- o Trapping rain water
- o Minimum stack
 - Celebrity Problem.

Sum of Subarray Minimums

int[] arr = { 3, 4, 2, 5, 6, 7, 1 }

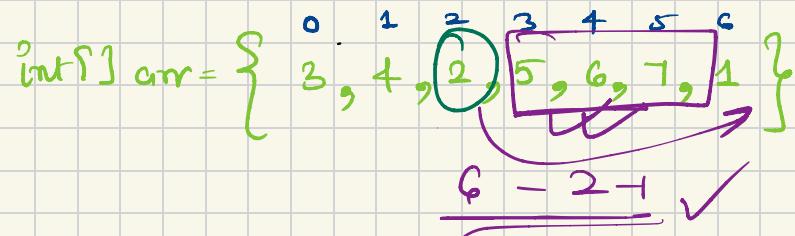


$$\sum_i \minVal$$

Brute Force

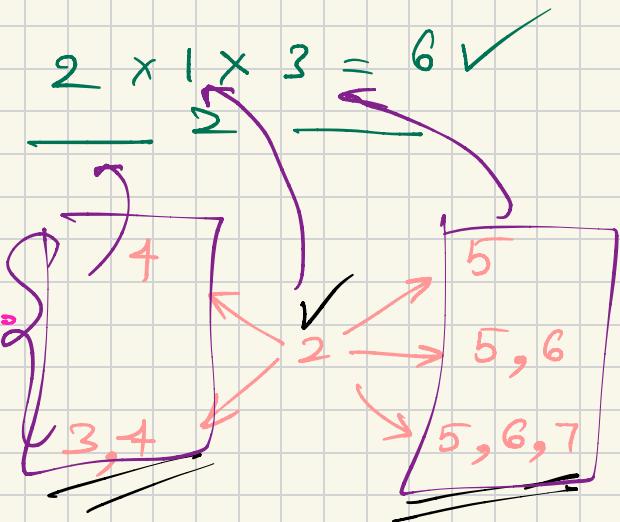
- o Nested loop: to find subarray,
- o try to calc. minⁿ of the subarray.
- o sum = minVal

{TC: O(N²) }
SC: O(1)



$$\text{Sum} = 3 \times a + 4 \times b + 2 \times c + 5 \times d \dots \dots \dots$$

\downarrow
 No. of subarrays, where ele is min.



No. of Subarray $\left\{ \text{Where ele is min} \right\}$ = $1 + 3 + 2 + 2 \times 3$

= 12 ✓

Total Subarray } where ele is min }

$$= \boxed{1 + l \times r + l \times r}$$

✓ No. of Ele on left

$$\begin{aligned} & l + l + r + l \\ & = (l + l) + r(l + l) \\ & \cancel{\quad} \quad \underline{(l + l)(l + r)} \end{aligned}$$

$$\left. \begin{aligned} l &= i_{hs} - nse[i-1] \\ r &= nse[i] - id[n-1] \end{aligned} \right\} \checkmark$$

$$\frac{q}{\underline{}} \quad \frac{q}{\underline{}} \quad \frac{q}{\underline{}} = \underline{\underline{q^3}}$$

↓ ↓ ↓

$(1-q) \quad (1-q) \quad (1-q)$

$$2 \times 1 \times 3 = \boxed{6} \checkmark$$

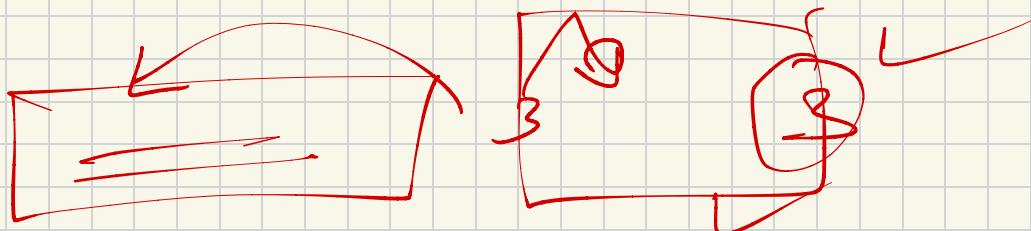
$$- \frac{A}{\underline{\underline{}}}$$

↙

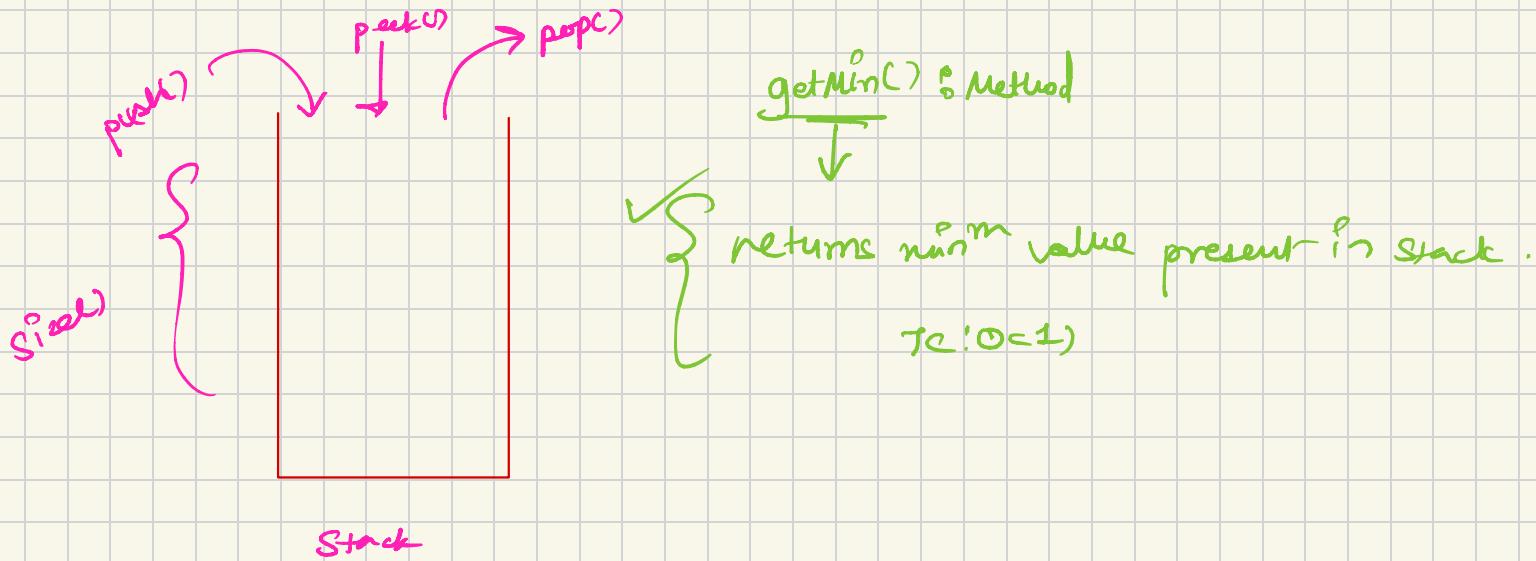
$\{T, R\}$

$\{X, C, M\}$

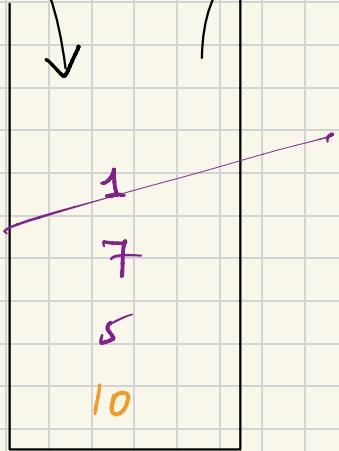
$\{ \underline{\underline{3}}, 3, 3, 3 \}$



Minimum Stack

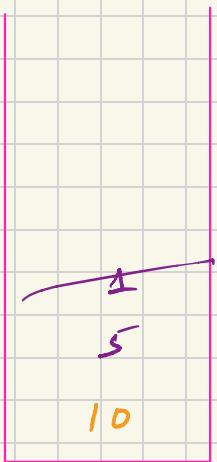


push()



Stack

pop()



AuxStack

push(10)

push(5)

push(7)

getMin() ~> 5

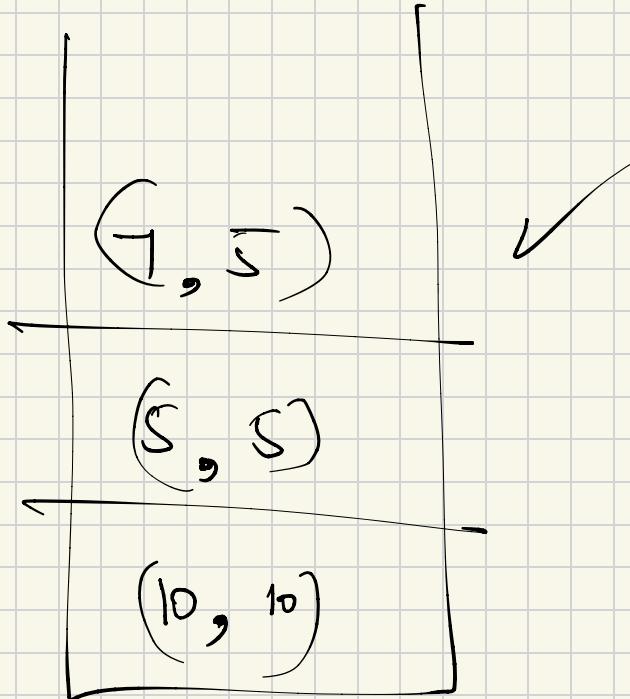
push(1)

pop()

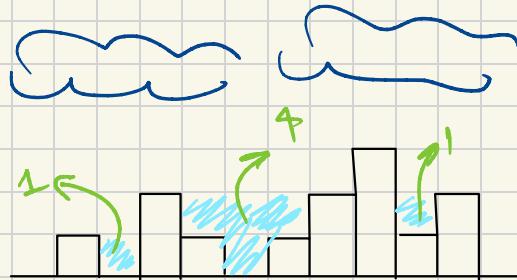
TC: O(1) SC: O(1)

✓ class pair

{
 int val;
 int minVal;
}



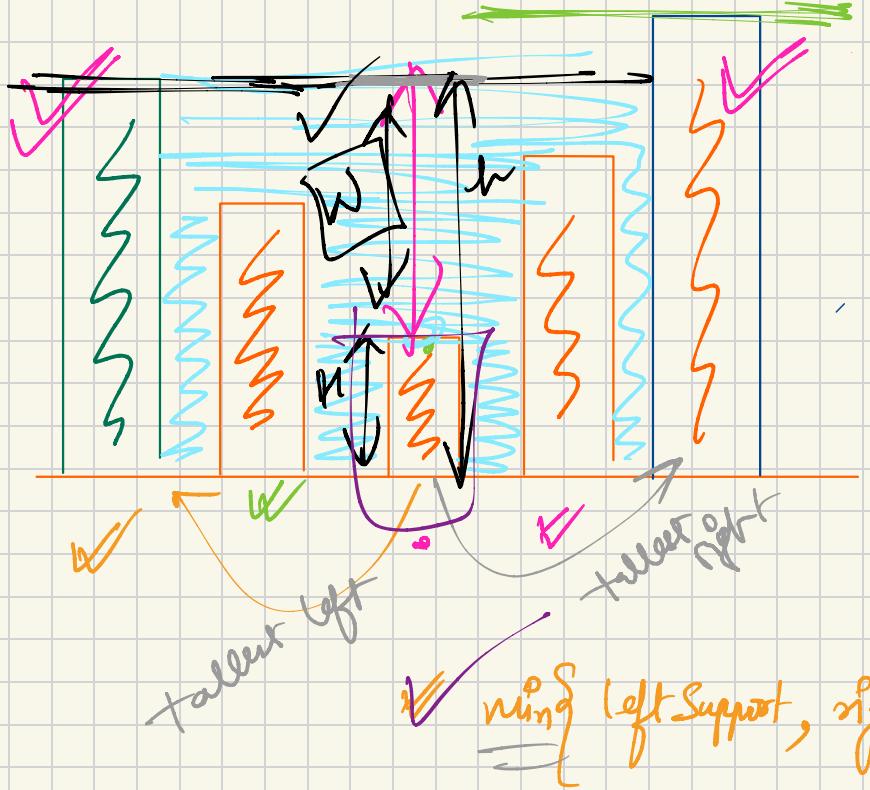
Trapping Rain Water



Water stored = 6 sq. units

{ } ~~if~~ int[] list = {0, 1, 2, 1, 0, 1, 2, 3, 1, 2, 0}

~~if~~ = 6 sq. units



ring left Support, right support }
=

Bruke Force

T

- ① stand at each building
- ② Scan left array and right array,
- ③ Store max on each side
- ④ Calc. height of water

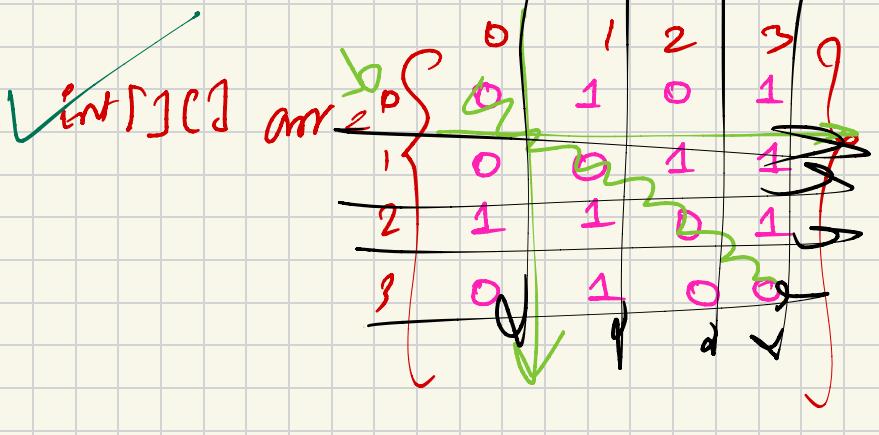
Specifying sc: O(n)
{ }
S

int[] hist - {
 0, 1, 2, 1, 0, 1, 2, 3, 1, 2, 0
 ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ }

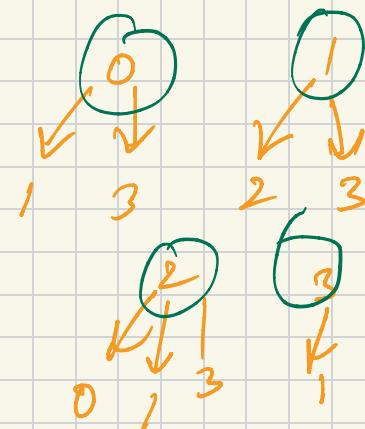
max 0 0 1 2 2 2 2 3 3 3

min 3 3 3 3 3 3 2 2 0 0

Celebrity Problem



arr[0][1]



Celebrity is a person, who's known by everyone, but
doesn't know anyone

✓ $\text{anti}[i][j] = 0$

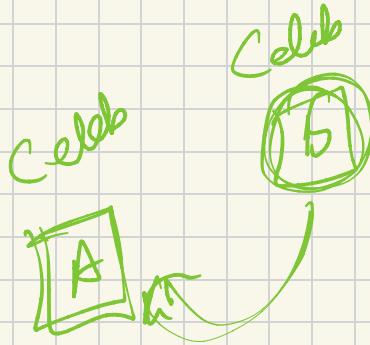
i doesn't know j

✓ $\text{anti}[i][j] = 1$

i knows j

o Celeb is not always present

o Can you have more than one? No



o Colub

$\begin{cases} \rightarrow \text{Row zero} \\ \rightarrow \text{Col one} \end{cases}$ } except diag. ✓

route form

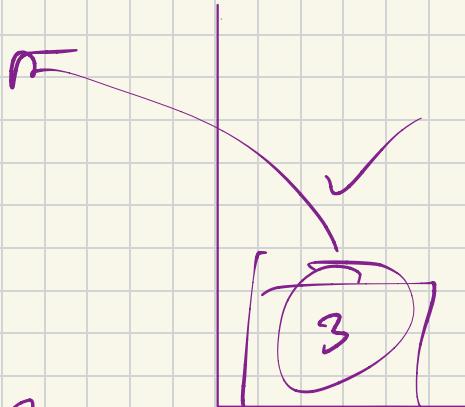
TC! O(N^2) SC! O(1)

\checkmark int arr[4][4]

0	1	2	3	9
1	0	1	1	
2	1	1	0	
3	0	1	0	
9				

\checkmark Elimination Method

Non above



2, 3

$$\text{TC: } O(N) + O(N) = O(N) \quad SC: \sim O(N)$$

Stack

