

Let's start at 9:02 PM

L45

Mixed Problem Solving

Join Discord - <https://bit.ly/ly-discord>

RECAP

```
for (int i = - i < n) {  
    while (qr.size() > a[qr.back()]) <= a[i])  
        qr.pop_back();  
    qr.push(i);  
}
```

Time & Space Complexity
for sliding window max.

Space $\Rightarrow \mathcal{O}(k)$

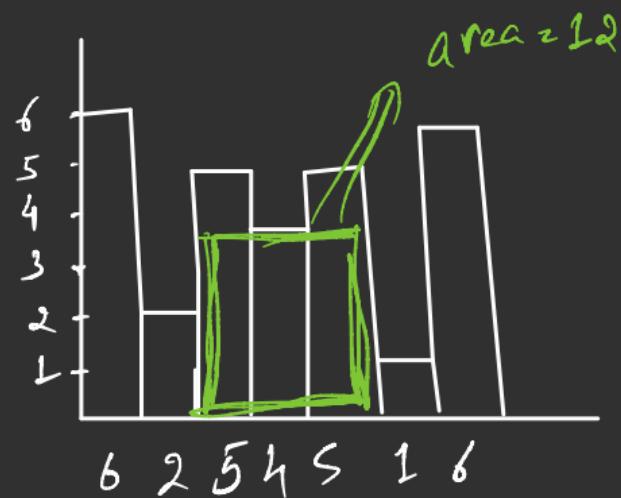
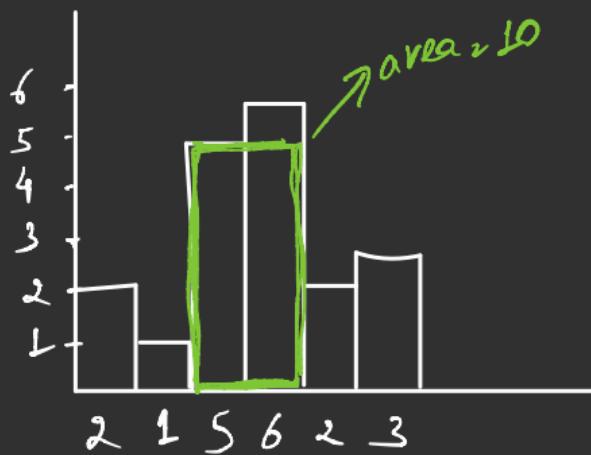
Time $\Rightarrow \mathcal{O}(n)$

Today - Again practice (Good Problems)

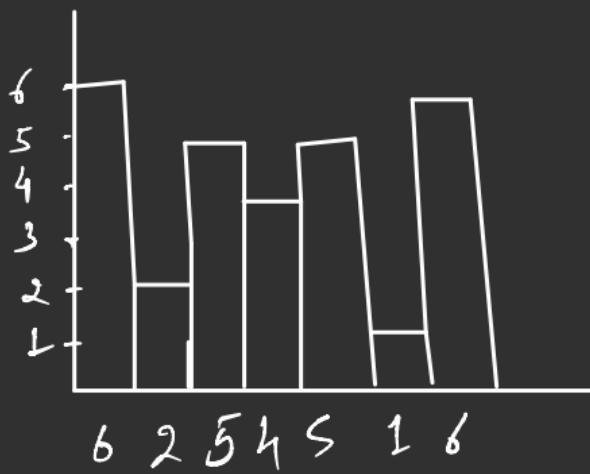
1. Largest Rectangle in a Histogram

$$\text{arr} = \{2, 1, 5, 6, 2, 3\}$$

$$\text{arr} = [6, 2, 5, 4, 5, 1, 6]$$



$\text{arr} = [6, 2, 5, 4, 5, 1, 6]$



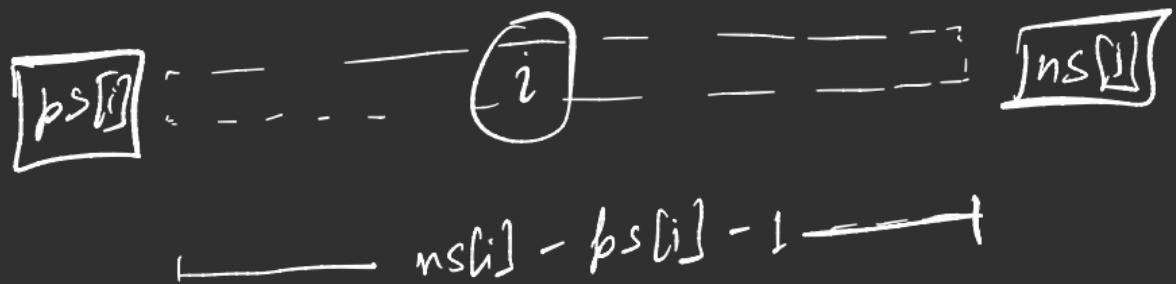
Method 1: Try all different weights &
try to find best possible
wealth. for each.

2nd Method: Try all subarrays, find the max possible height.

$$[l \dots r] \Rightarrow \underbrace{(r-l+1)}_{\text{width}} * \underbrace{\min(\text{arr}[l \dots r])}_{\text{Best possible height}}$$

Time $\Rightarrow O(N^2)$

(-i) $0 - - - - i - - - - n-1$ (n)



Part 1

2. Max Value (a good one)

$P, X(x \text{ is sorted in inc order}) \Rightarrow \text{size} = N$

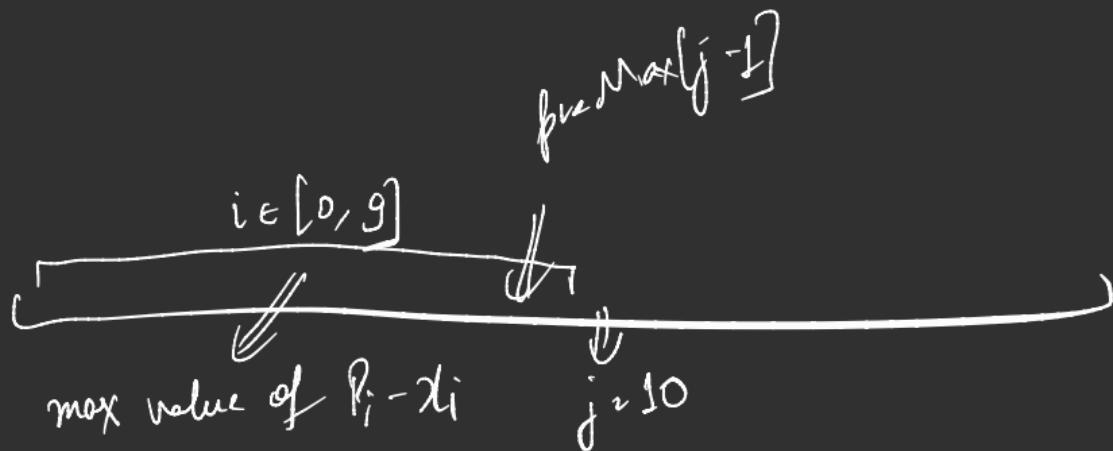
Find the maximum^{possible} value of $P_i + P_j + |X_i - X_j|$

given that $i < j$.

$$P_i + P_j + |x_i - x_j|$$

$$\Rightarrow P_i + P_j + x_j - x_i$$

$$\Rightarrow (P_i - x_i) + (P_j + x_j)$$



$\text{ans} = \max(\text{ans}, \text{preMax}[j-1] + p[j] + x[j]);$

Part 2

2. Max Value (a good one)

$P, X \left(x \text{ is sorted in inc order} \right) \Rightarrow \text{size} = N$
at an integer K

find the maximum^{possible} value of $P_i + P_j + |x_i - x_j|$
given that $i < j$ & $|x_i - x_j| \leq K$.

$$i=0, j=1 \Rightarrow 5$$

N = 4

$$i=0, j=2 \Rightarrow 10$$

P = [1, 4, 2, 5]

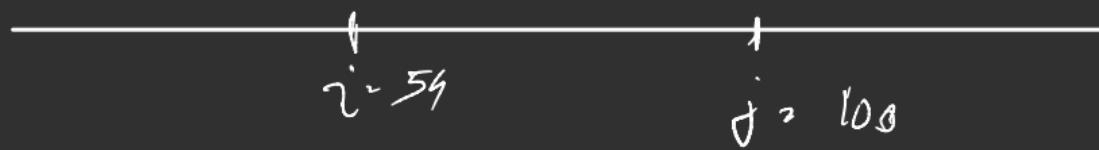
$$i=0, j=3 = \boxed{14}$$

X = [3, 6, 10, 11]

$$i=1, j=2 \Rightarrow 7$$

$$i=1, j=3 \Rightarrow 11$$

$$i=2, j=3 \Rightarrow 8$$



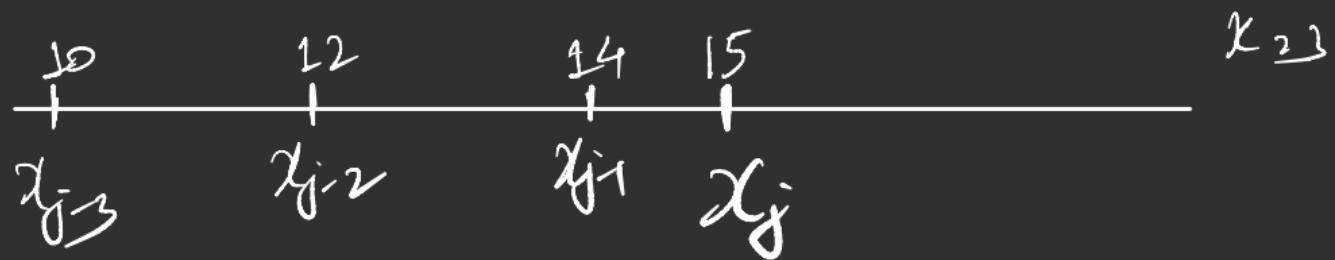
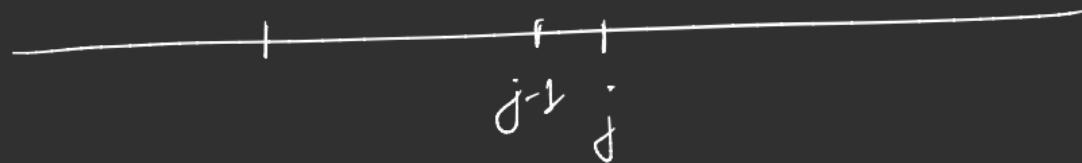
$$|x_i - x_j| \leq k$$

$$x_j - x_i \leq k$$

$$x_j - k \leq x_i$$

$$x_i \geq x_j - k$$

$$(P_i - X_i) + (P_j + X_j)$$



$(q.front() \leq i - k) \Rightarrow popping$

if $(x[q.front()] < x[i] - k) \Rightarrow popping$

Thank You!

Reminder: Going to the gym & observing the trainer work out can help you know the right technique, but you'll muscle up only if you lift some weights yourself.

So, PRACTICE, PRACTICE, PRACTICE!