Let's start at 9:02 PM sharp.

L32
Sorting : Problem Solving 1

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RECAP

1. Nuts & Bolts Problem
2. Quick Sort Intuition
3. Comparison to Merge Sort
4. Partition Function
5. Time Complexity Analysis
6. Implementation
7. Built-In Sort Functions
8. Custom Comparators

Let’s get straight to it. Will do some nice problem solving related to sorting today.

Qualifying to Pre-Elimination

Given an array of integers *arr*, find the minimum absolute difference b/w a pair of elements i.e. abs(arr[i] - arr[j]) where i != j

Eg. [10, 15, 7, 20, 8]

(10, 15) ⇒ 5

(10, 7) ⇒ 3

(10, 20) ⇒ 10

(10, 8) ⇒ 2

(15, 7) ⇒ 8

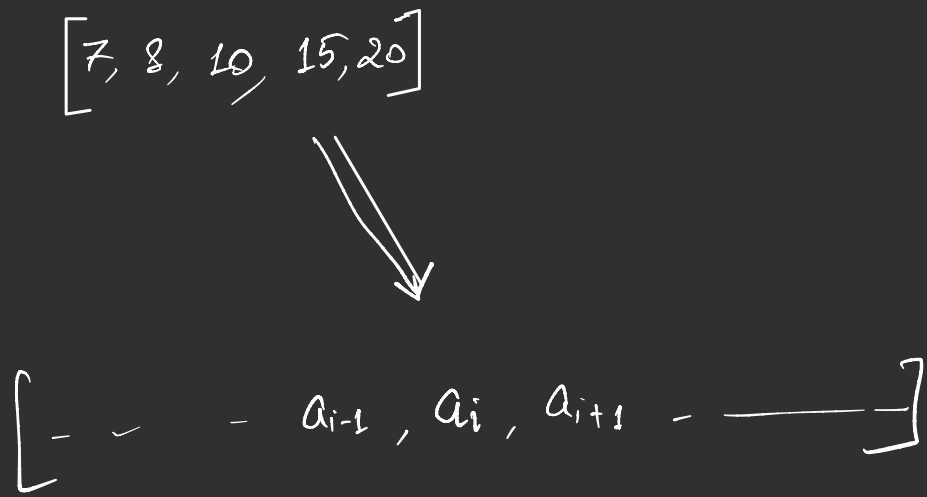
(15, 20) ⇒ 5

(15, 8) ⇒ 7

(7, 20) ⇒ 13

(7, 8) ⇒ 1

(20, 8) ⇒ 12



Part 2: Given that any K elements can be picked from a given Array, find the minimum possible absolute difference b/w the maximum element and the minimum element out of the K chosen ones.

N = 7, K = 3

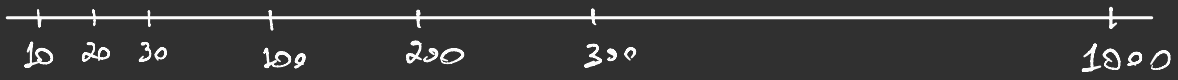
[10, 100, 300, 200, 1000, 20, 30]

(10, 100, 300) ⇒ 290

(100, 200, 300) ⇒ 200

(300, 200, 1000) ⇒ 800

(10, 20, 30) ⟹ 20



[10, 20, 30, 100, 200, 300, 1000]

20

[i, i+K-1]

smallest

largest

Sum of absolute differences (in a sorted array)

[1, 4, 6, 8, 10]

[24, 15,]

pref = [1, 5, 11, 19, 29]

suf = [29, 28, 24, 18, 10]

leftSum = i * a[i] − pre[i−1]

rightSum = suf[i+1] − (n−1−i) * a[i]

i = 1, a[i] = 4

$$(a[i] - a[0])$$
$$+ (a[i] - a[1])$$
$$+ (a[i] - a[2])$$
$$\vdots$$
$$+ (a[i] - a[i-1])$$

$$(a[i+1] - a[i])$$
$$+ (a[i+2] - a[i])$$
$$+ (a[i+2] - a[i])$$
$$\vdots$$
$$(a[n-1] - a[i])$$

$leftSum = (a[i] - a[0])$ — i terms

$+ (a[i] - a[1])$

$\vdots$

$+ (a[i] - a[i-1])$

$\Rightarrow (a[i] + a[i] + a[i] \cdots a[i]) - (a[0] + a[1] \cdots a[i-1])$

$\Rightarrow i * a[i] - prefSum[i-1]$

rightSum $(a[i+1] - a[i])$

$+ (a[i+2] - a[i])$

$\vdots$

$+ (a[n-1] - a[i])$

$(N-1-i)$ terms

$\Rightarrow (a[i+1] + a[i+2] \cdots a[n-1]) - (a[i] + a[i] \cdots a[i])$

$\Rightarrow$ sufSum[i+1] $- (n-1-i) * a[i]$

$$ans[i] = i * a[i] - pre[i-1] + suf[i+1] - (n-1-i) * a[i]$$

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!