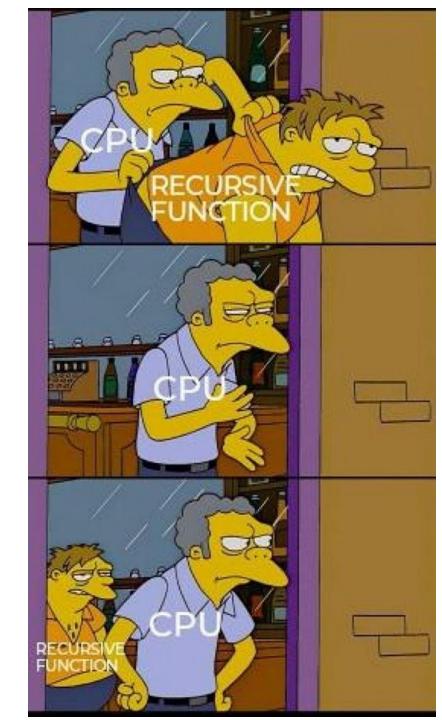
Competitive Programming

Lec 3. Array & Sorting



Sorting Algorithms

- 1. Merge Sort
- 2. Quick sort

Avg. Time Complexity: O(N log N)

Algorithm visualization

Equilibrium point [Easy]

Given an array A of N positive numbers. The task is to find the position where equilibrium first occurs in the array. Equilibrium position in an array is a position such that the sum of elements before it is equal to the sum of elements after it.

Ex.

13522

solution

Trapping Rain Water [Medium]

Given an array arr[] of N non-negative integers representing height of blocks at index i as Ai where the width of each block is 1. Compute how much water can be trapped in between blocks after raining.

Ex.

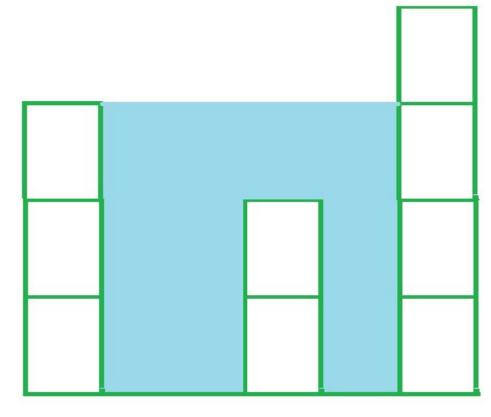
Input:

4

7409

Output:

10



Bars for input $\{3, 0, 0, 2, 0, 4\}$ Total trapped water = 3 + 3 + 1 + 3 = 10

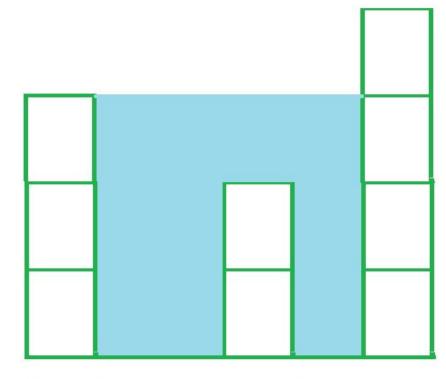
Trapping Rain Water [Medium]

Input: [2 3 0 0 2 0 4 0 5]

Left_Max: [2 3 3 3 3 3 4 4 5]

Right_Mx: [5 5 5 5 5 5 5 5 5]

solution



Bars for input $\{3, 0, 0, 2, 0, 4\}$ Total trapped water = 3 + 3 + 1 + 3 = 10

Maximum Consecutive Gap [Hard]

Given an unsorted array, find the maximum difference between the successive elements in its sorted form.

Try to solve it in **linear time/space**.

Example:

Hint: Radix sort

Input: [1, 10, 5]

Output: 5

Return 0 if the array contains less than 2 elements.

- You may assume that all the elements in the array are non-negative integers and fit in the 32-bit signed integer range.
- You may also assume that the difference will not overflow.

Homework

- 1. <u>Leader</u> [similar to Equilibrium point problem]
- 2. <u>Eat Twice</u> [vector of pairs]
- 3. <u>Merge Overlapping Intervals</u> [vector, pair, comparator, asked in Google, Amazon]
- 4. <u>Spiral Order Matrix II</u> [this problem will improve your implementation skills]
- 5. <u>Sereja and Stairs</u> [vector, sorting]