

# Absolute Element Sums

locked

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Problem

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The task: Add  $x$  to each element of the original array and print the sum of the absolute values of all elements.

If we add all the queries  $x$  before query  $i + 1$ , and then solve the above query with the sum as  $x$ , you will get the result for query  $i$ .

Case 1:  $x$  is negative

1. Concentrate on the negative values in the array. The contribution from these elements will be  $A[v] + x$ , where  $v$  is some index such that  $A[v] < 0$ . We can simply sum up all the negative values and then take their absolute value. This sum can be updated in  $O(1)$  by maintaining running sums for the the array's current positive and negative elements.
2. Move on to the positive values in the array.
  1. The contribution from positive elements  $< abs(x)$  will be  $A[v] + x < 0$ , so we sum them and take the absolute value of it. This can be done in  $O(log N)$  time using set and storing prefix sum and the element in the set.
  2. The contribution from positive elements  $> abs(x)$  will be  $A[v] + x > 0$ . Here we do not need to take the absolute value of the sum, because we are dealing with positive numbers. This can be easily calculated by storing the sum of all positive elements and using previous data.

Case 2:  $x$  is positive

Similar to Case 1.

## Statistics

Difficulty: **Hard**

Time  $O(\log N)$

Complexity: **Required**

Knowledge: **Binary Search**

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