

Problem

Teleport

Time limit: 4 seconds

Little Cyan Fish is on a number line. Initially, he is at position a_0 , and his home is at position 0.

He wants to visit the positions $a_1, a_2, \dots, a_n$ in this order. He can walk in either direction along the number line. At any time, he can teleport to his home or move his home to his current position. Both actions are free and can be performed any number of times, including while he is walking.

Find the minimum total distance he needs to walk to visit all the positions in the given order.

Input

There are multiple test cases. The first line of the input contains a single integer T ($1 \leq T$), indicating the number of test cases.

For each test case, the first line contains a single integer n ($1 \leq n \leq 5 \times 10^5$), indicating the number of positions to visit. The second line contains $n + 1$ integers $a_0, a_1, \dots, a_n$ ($-10^9 \leq a_i \leq 10^9$), indicating the initial position and the positions to visit.

It is guaranteed that the sum of n over all test cases does not exceed 5×10^5 .

Output

For each test case, output a single line containing a single integer, indicating the minimum total distance Little Cyan Fish needs to walk.

Sample Input 1

Sample Output 1

4	0
1	10
7 0	6
2	8
0 10 5	
3	
0 4 2 0	
3	
-2 3 -2 3	

In the first sample test case, Little Cyan Fish teleports to his home at position 0, so he does not need to walk.

In the second sample test case, he walks from 0 to 10 and moves his home to position 5 on the way. He then teleports to position 5. The total distance is 10.

In the third sample test case, he walks from 0 to 4 and moves his home to position 2 on the way. He then teleports to 2 and walks to 0. The total distance is $4 + 2 = 6$.

In the fourth sample test case, he teleports to 0, walks to 3, and moves his home to 3. He then walks to -2 and teleports to 3. The total distance is $3 + 5 = 8$.