DMOPC '22 Contest 1 P1 - Up-down Sequence

Time limit: 2.0s **Memory limit:** 256M

An up-down sequence is any sequence where the elements alternate between increasing and decreasing. Formally, a sequence A of N integers is considered to be an up-down sequence if for each $1 < i < N$, either $A_{i-1} < A_i > A_{i+1}$ or $A_{i-1} > A_i < A_{i+1}$. Given a sequence of N integers, some of which are forgotten, you must determine whether it is possible to replace each forgotten element with any integer so that the resulting sequence is an up-down sequence. To ensure the integrity of your solution, there will be T test cases.

Constraints

$1 \leq T \leq 10^6$

$3 \leq N \leq 10^6$

$0 \leq A_i \leq 10^9$

The sum of N over all test cases does not exceed 10^6.

Subtask 1 [20%]

$1 \leq A_i \leq 10^9$

Subtask 2 [80%]

No additional constraints.

Input Specification

The first line contains an integer T, the number of test cases. The next $2T$ lines describe the test cases.

The first line of each test case contains a single integer N.

The second line of each test case contains N integers $A_1, A_2, \ldots, A_N$. Forgotten elements are denoted by 0s in the sequence.

Output Specification

For each test case, output a single line containing `YES` if it is possible to make it an up-down sequence or `NO` otherwise.

Sample Input

```
4
7
1 0 2 5 3 0 2
5
3 0 1 2 3
4
1 0 0 1
3
6 6 0
```

Sample Output

```
YES
NO
YES
NO
```

Explanation for Sample

For the first test case, one may convert the sequence to $[1, 3, 2, 5, 3, 4, 2]$.

For the third test case, one may convert the sequence to $[1, -1, 2, 1]$.