Problem M. Max Minus Min

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

You are given array a of n integers. You can perform the following operation at most once:

- Choose any integers $1 \le l \le r \le n$, and any integer x. Then, for each $l \le i \le r$, replace a_i with $a_i + x$.

Find the smallest possible value of $\max(a_1, a_2, \ldots, a_n) - \min(a_1, a_2, \ldots, a_n)$ you can get after performing this operation at most once.

Input

The first line contains a single integer t ($1 \le t \le 10^5$) — the number of test cases. The description of test cases follows.

The first line of each test case contains a single integer n ($1 \le n \le 2 \cdot 10^5$) — the length of the array.

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($0 \le a_i \le 10^9$) — elements of the array.

It is guaranteed that the sum of n over all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, in the first line output a single integer — the smallest possible value of $\max(a_1, a_2, \ldots, a_n) - \min(a_1, a_2, \ldots, a_n)$ you can get after performing this operation at most once.

Example

standard input	standard output
4 3 42 42 42 4 1 2 2 1 5 1 100 1 100 1 6 1 2 3 4 5 6	0 0 99 2

Note

In the first test case, you don't need to make any operations, since $max - min = 0$ already.

In the second test case, you can choose $x = -1$, and segment $a[2:3]$. The array will become $[1, 1, 1, 1]$, with $max - min = 0$.

In the third test case, $max - min$ initially is 99. Unfortunately, it's not possible to decrease this value with a single operation.

In the fourth test case, $max - min$ initially is 5, but we can choose $x = 3$ and segment $a[1:3]$. The array will become $[4, 5, 6, 4, 5, 6]$, with $max - min = 2$.