E. Weakness and Poorness

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given a sequence of n integers $a_1, a_2, ..., a_n$.

Determine a real number x such that the *weakness* of the sequence $a_1 - x, a_2 - x, ..., a_n - x$ is as small as possible.

The *weakness* of a sequence is defined as the maximum value of the *poorness* over all segments (contiguous subsequences) of a sequence.

The *poorness* of a segment is defined as the absolute value of sum of the elements of segment.

Input

The first line contains one integer n ($1 \le n \le 200\,000$), the length of a sequence.

The second line contains n integers $a_1, a_2, ..., a_n$ ($|a_i| \le 10\,000$).

Output

Output a real number denoting the minimum possible *weakness* of $a_1 - x, a_2 - x, ..., a_n - x$. Your answer will be considered correct if its relative or absolute error doesn't exceed 10^{-6}.

Examples

input
3 1 2 3
output
1.000000000000000

input
4 1 2 3 4
output
2.000000000000000

input
10 1 10 2 9 3 8 4 7 5 6
output
4.500000000000000

Note

For the first case, the optimal value of x is 2 so the sequence becomes $-1, 0, 1$ and the max poorness occurs at the segment "-1" or segment "1". The poorness value (answer) equals to 1 in this case.

For the second sample the optimal value of x is 2.5 so the sequence becomes $-1.5, -0.5, 0.5, 1.5$ and the max poorness occurs on segment "-1.5 -0.5" or "0.5 1.5". The poorness value (answer) equals to 2 in this case.