Problem B: Copper Hydroxide

Time limit: 2s; Memory limit: 256 MB

Copper Hydroxide (chemical formula $Cu(OH)_2$) is a pale greenish blue or bluish green solid. It is a beautiful strong base, as this problem is for strong and beautiful coders. Let's prove it!

Given a vector $a = (a_1, a_2, \dots, a_n)$ in $\mathbb{R}^n$. A vector $b = (b_1, b_2, \dots, b_n)$ is non-increasing if and only if $b_1 \le b_2 \le \dots \le b_n$.

The Euclide distance between two vectors a, b is calculated as

$$d(a,b) = \sqrt{(a_1 - b_1)^2 + (a_2 - b_2)^2 + \dots + (a_n - b_n)^2}$$

Find a non-decreasing vector b in $\mathbb{R}^n$ such that $d(a,b)$ is minimized.

Input

The first line contains a natural number, n $(1 \le n \le 10^6)$

The second line contains n real numbers $a_1, a_2, \dots, a_n$ $(|a_i| \le 10^5)$. Each of them has at most 3 decimal digits in the input.

Output

Print one real number, which is the min $d(a,b)$, for all non-increasing vector b. The answer is accepted if the absolute error or relative error does not exceed 10^{-6}.

Sample

Input	Output
3 1 1 2	0
4 3.368 97.561 80 353	12.41750218

Explanation

In sample 1, $a = (1, 1, 2)$, which is already non-decreasing. We choose $b = (1, 1, 2)$ then $d(a,b) = 0$.

In sample 2, we choose $b = (3.368, 88.7805, 88.7805, 353)$. Then, $d(a,b) = \sqrt{0 + (97.561 - 88.7805)^2 + (80 - 88.7805)^2 + 0} = 12.41750218\dots$

Bonus: Find out what $Cu(OH)_2$ facts that correspond to numbers in sample 2.
Good luck!