Problem C. Barrel Theory

Time limit 1000 ms
Memory limit 256MB

Problem Description

In cybersecurity, there's a famous analogy: a system's security is like a wooden barrel — **it is only as strong as its weakest stave.**

You are analyzing a system with n security modules. For a global parameter x (which can be any real number), the i-th module's vulnerability level v_i is modeled as:

$$v_i = a_i x + b_i$$

The closer v_i is to 0, the safer the module is. But if any module has a large absolute vulnerability, attackers will exploit it — just like water leaking from the shortest stave of the barrel.

You are given a chance to modify the value of x. According to the barrel theroy, you task is not to make the strongest module even stronger, but to minimize the worst weakness.

Formally, choose a real number x that minimizes

$$max_{1 \le i \le n} |a_i x + b_i|$$

You only need to report this minimum value; there is no need to determine the value of x.

Input format

The first line contains one integer n ($1 \le n \le 2 \cdot 10^5$) — the number of modules.

Each of the next n lines contains two integers a_i, b_i ($|a_i|, |b_i| \le 10^6$). — the parameters of the i-th module.

Output format

Output the minimum possible value.

Your answer will be accepted if its absolute or relative error does not exceed 10^{-6}. (If the correct answer is a, and the contestant's output is b, the answer is considered correct if $\frac{|a-b|}{\max(|a|,1)} < 10^{-6}$.)

Subtask score

Subtask	Score	Additional Constraints
1	10	$a_i = 1$
2	40	$a_i > 0$
3	50	No additional constraints

Sample

Sample Input 1

```
5
1 2
1 4
1 6
1 8
1 10
```

Sample Output 1

```
4
```

Sample Input 2

```
6
2 0
-3 -6
-1 4
-2 10
0 -8
3 4
```

Sample Output 2

```
8.399999999999998579
```

Notes

For Example 1, choosing $x = -6$ yields the minimum value 4. Note that if your output is, for example, 3.999999999, it will also be considered correct.