A. Fancy Fence

time limit per test: 2 seconds
memory limit per test: 256 megabytes

Emuskald needs a fence around his farm, but he is too lazy to build it himself. So he purchased a fence-building robot.

He wants the fence to be a regular polygon. The robot builds the fence along a single path, but it can only make fence corners at a single angle a.

Will the robot be able to build the fence Emuskald wants? In other words, is there a regular polygon which angles are equal to a?

Input

The first line of input contains an integer t ($0 < t < 180$) — the number of tests. Each of the following t lines contains a single integer a ($0 < a < 180$) — the angle the robot can make corners at measured in degrees.

Output

For each test, output on a single line "YES" (without quotes), if the robot can build a fence Emuskald wants, and "NO" (without quotes), if it is impossible.

Examples

input	output
3 30 60 90	NO YES YES

Note

In the first test case, it is impossible to build the fence, since there is no regular polygon with angle 30°.

In the second test case, the fence is a regular triangle, and in the last test case — a square.

B. Trace

time limit per test: 2 seconds

memory limit per test: 256 megabytes

One day, as Sherlock Holmes was tracking down one very important criminal, he found a wonderful painting on the wall. This wall could be represented as a plane. The painting had several concentric circles that divided the wall into several parts. Some parts were painted red and all the other were painted blue. Besides, any two neighboring parts were painted different colors, that is, the red and the blue color were alternating, i. e. followed one after the other. The outer area of the wall (the area that lied outside all circles) was painted blue. Help Sherlock Holmes determine the total area of red parts of the wall.

Let us remind you that two circles are called concentric if their centers coincide. Several circles are called concentric if any two of them are concentric.

Input

The first line contains the single integer n ($1 \le n \le 100$). The second line contains n space-separated integers r_i ($1 \le r_i \le 1000$) — the circles' radii. It is guaranteed that all circles are different.

Output

Print the single real number — total area of the part of the wall that is painted red. The answer is accepted if absolute or relative error doesn't exceed 10^{-4}.

Examples

input	output
1 1	3.1415926536

input	output
3 1 4 2	40.8407044967

Note

In the first sample the picture is just one circle of radius 1. Inner part of the circle is painted red. The area of the red part equals $\pi \times 1^2 = \pi$.

In the second sample there are three circles of radii 1, 4 and 2. Outside part of the second circle is painted blue. Part between the second and the third circles is painted red. Part between the first and the third is painted blue. And, finally, the inner part of the first circle is painted red. Overall there are two red parts: the ring between the second and the third circles and the inner part of the first circle. Total area of the red parts is equal $(\pi \times 4^2 - \pi \times 2^2) + \pi \times 1^2 = \pi \times 12 + \pi = 13\pi$

C. Nearest vectors

time limit per test: 2 seconds
memory limit per test: 256 megabytes

You are given the set of vectors on the plane, each of them starting at the origin. Your task is to find a pair of vectors with the minimal non-oriented angle between them.

Non-oriented angle is non-negative value, minimal between clockwise and counterclockwise direction angles. Non-oriented angle is always between 0 and π. For example, opposite directions vectors have angle equals to π.

Input

First line of the input contains a single integer n ($2 \le n \le 100\,000$) — the number of vectors.

The i-th of the following n lines contains two integers x_i and y_i ($|x|, |y| \le 10\,000, x^2 + y^2 > 0$) — the coordinates of the i-th vector. Vectors are numbered from 1 to n in order of appearing in the input. It is guaranteed that no two vectors in the input share the same direction (but they still can have opposite directions).

Output

Print two integer numbers a and b ($a \ne b$) — a pair of indices of vectors with the minimal non-oriented angle. You can print the numbers in any order. If there are many possible answers, print any.

Examples

input

```
4
-1 0
0 -1
1 0
1 1
```

output

```
3 4
```

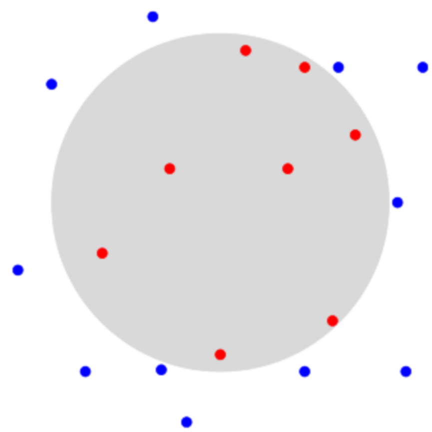
input

```
6
-1 0
0 -1
1 0
1 1
-4 -5
-4 -6
```

output

```
6 5
```

Problem D
Dendroctonus
Time limit: 8 seconds



Mountain pine beetles (*Dendroctonus ponderosae*) are small pests that bore into trees and cause a huge amount of damage. Recently, a large increase in their population has occurred and scientists would like some more information about the origin of the outbreak(s). In particular, they want to know if there was a single outbreak or multiple outbreaks. If there is more than one outbreak, then they must raise the alert level.

For each outbreak, the beetles start at a single location (known as the *initial infection point*) and slowly work their way outwards. If a tree is inside the infection area, then it is infected. If a tree is outside of the infection area, then it is not infected. If a tree is on the boundary of the infection area, then it may or may not be infected. The infection area is always a circle centred at the initial infection point.

Given the locations of the infected and non-infected trees, the scientists need you to determine if there is enough evidence to raise the alert level.

Input

The first line of the input contains a single integer n ($1 \le n \le 100$), which is the number of trees.

The next n lines describe the trees. Each of these lines contains two integers x ($-250 \le x \le 250$) and y ($-250 \le y \le 250$), which is the location of the tree, as well as a single character p (`I` or `N`), denoting if the tree is infected or not. If p is `I`, then the tree is infected. If p is `N`, then the tree is not infected. Trees are single points on the plane. Note that the initial infection point for an outbreak does not need to be a tree and does not have to be at an integer location. The n trees are at distinct locations.

Output

If it is guaranteed that there is more than one outbreak, display `Yes`. Otherwise, display `No`.

Sample Input 1

```
7
0 0 I
1 0 I
0 1 I
4 4 N
4 -4 N
-4 4 N
-4 -4 N
```

Sample Output 1

```
No
```

E. Freelancer's Dreams

time limit per test: 2 seconds

memory limit per test: 256 megabytes

Mikhail the Freelancer dreams of two things: to become a cool programmer and to buy a flat in Moscow. To become a cool programmer, he needs at least p experience points, and a desired flat in Moscow costs q dollars. Mikhail is determined to follow his dreams and registered at a freelance site.

He has suggestions to work on n distinct projects. Mikhail has already evaluated that the participation in the i-th project will increase his experience by a_i per day and bring b_i dollars per day. As freelance work implies flexible working hours, Mikhail is free to stop working on one project at any time and start working on another project. Doing so, he receives the respective share of experience and money. Mikhail is only trying to become a cool programmer, so he is able to work only on one project at any moment of time.

Find the real value, equal to the minimum number of days Mikhail needs to make his dream come true.

For example, suppose Mikhail is suggested to work on three projects and $a_1 = 6$, $b_1 = 2$, $a_2 = 1$, $b_2 = 3$, $a_3 = 2$, $b_3 = 6$. Also, $p = 20$ and $q = 20$. In order to achieve his aims Mikhail has to work for 2.5 days on both first and third projects. Indeed, $a_1 \cdot 2.5 + a_2 \cdot 0 + a_3 \cdot 2.5 = 6 \cdot 2.5 + 1 \cdot 0 + 2 \cdot 2.5 = 20$ and $b_1 \cdot 2.5 + b_2 \cdot 0 + b_3 \cdot 2.5 = 2 \cdot 2.5 + 3 \cdot 0 + 6 \cdot 2.5 = 20$.

Input

The first line of the input contains three integers n, p and q ($1 \le n \le 100\,000$, $1 \le p, q \le 1\,000\,000$) — the number of projects and the required number of experience and money.

Each of the next n lines contains two integers a_i and b_i ($1 \le a_i, b_i \le 1\,000\,000$) — the daily increase in experience and daily income for working on the i-th project.

Output

Print a real value — the minimum number of days Mikhail needs to get the required amount of experience and money. Your answer will be considered correct if its absolute or relative error does not exceed 10^{-6}.

Namely: let's assume that your answer is a, and the answer of the jury is b. The checker program will consider your answer correct, if $\frac{|a-b|}{\max(1,b)} \le 10^{-6}$.

Examples

input

```
3 20 20
6 2
1 3
2 6
```

output

```
5.000000000000000
```

input

```
4 1 1
2 3
3 2
2 3
3 2
```

output

```
0.400000000000000
```

Note

First sample corresponds to the example in the problem statement.

F. Runaway to a Shadow

time limit per test: 1 second
memory limit per test: 256 megabytes

Dima is living in a dormitory, as well as some cockroaches.

At the moment 0 Dima saw a cockroach running on a table and decided to kill it. Dima needs exactly T seconds for aiming, and after that he will precisely strike the cockroach and finish it.

To survive the cockroach has to run into a shadow, cast by round plates standing on the table, in T seconds. Shadow casted by any of the plates has the shape of a circle. Shadow circles may intersect, nest or overlap arbitrarily.

The cockroach uses the following strategy: first he equiprobably picks a direction to run towards and then runs towards it with the constant speed v. If at some moment $t \le T$ it reaches any shadow circle, it immediately stops in the shadow and thus will stay alive. Otherwise the cockroach is killed by the Dima's precise strike. Consider that the Dima's precise strike is instant.

Determine the probability of that the cockroach will stay alive.

Input

In the first line of the input the four integers x_0, y_0, v, T ($|x_0|, |y_0| \le 10^9$, $0 \le v, T \le 10^9$) are given — the cockroach initial position on the table in the Cartesian system at the moment 0, the cockroach's constant speed and the time in seconds Dima needs for aiming respectively.

In the next line the only number n ($1 \le n \le 100\,000$) is given — the number of shadow circles casted by plates.

In the next n lines shadow circle description is given: the i^{th} of them consists of three integers x_i, y_i, r_i ($|x_i|, |y_i| \le 10^9$, $0 \le r \le 10^9$) — the i^{th} shadow circle on-table position in the Cartesian system and its radius respectively.

Consider that the table is big enough for the cockroach not to run to the table edges and avoid Dima's precise strike.

Output

Print the only real number p — the probability of that the cockroach will stay alive.

Your answer will be considered correct if its absolute or relative error does not exceed 10^{-4}.

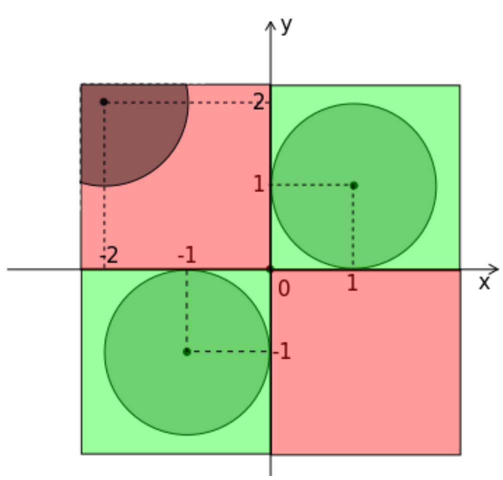
Examples

input
```
0 0 1 1
3
1 1 1
-1 -1 1
-2 2 1
```
output
```
0.50000000000
```

input
```
0 0 1 0
1
1 0 1
```
output
```
1.00000000000
```

Note

The picture for the first sample is given below.



Red color stands for points which being chosen as the cockroach's running direction will cause him being killed, green color for those standing for survival directions. Please note that despite containing a circle centered in (- 2, 2) a part of zone is colored red because the cockroach is not able to reach it in one second.