

Prime Cut 5

time limit per test: 6 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

points: 100 · problem code: primecut5 · author: caneToadCoad

Kirby has to set up a space station to survey a set of n stars, each of which has a distinct position (x_i, y_i) . To set up a space station, Kirby must choose a position on a cut in spacetime. This cut is a line segment that begins at position $(s, 0)$ and ends at $(e, 0)$, meaning that kirby can choose any position on the x axis between s and e for his space station. The space station will send out a light beam to each star sequentially, starting with star 1, then 2, ... until it sends a signal to star n . When the station sends out a signal to a star i , it takes d_i seconds to reach the star, where d_i is the distance to the star from the space station. the signal then takes d_i seconds to travel back to the space station. Only then can the station send a signal to star $i + 1$.

The amount of time taken to send and receive a signal from every star is a period, and can be expressed as $2d_1 + 2d_2 + 2d_3 \dots + 2d_n$. Kirby wants to maximise the number of signals sent to stars, so he wants to choose a position for his station such that the period is small as possible. What is the smallest period that can be achieved?

hint: functions of the form $f(x) = (x - a)/\text{sqrt}((x - a)^2 + b^2)$ are monotonically increasing.

Input

The first line has 3 integers n, s, e , ($1 \leq n \leq 1e5$)($-1e5 \leq s, e \leq 1e5$), the number of stars, and the start and end points of the cut in spacetime.

n lines follow, each with $x_i y_i$, the coordinates of a star $-1e5 \leq x_i, y_i \leq 1e5$.

All points are distinct and guaranteed to not be all collinear.

Output

Write the smallest possible period that occurs when kirby chooses the optimal location for a space station

Sample Input

Input 1

```
2 -1000 1000
1 1
2 2
```

Output 1

```
6.32455532
```

Input 2

```
1 -2000 1000
5 5
```

Output 2

```
10
```

Input 3

```
7 -10 0
8 3
10 1
0 2
0 8
7 2
0 0
5 10
```

Output 3

```
94.10865829
```