

5. Art Exhibition (pilt)

1 sec / 3 sec

60 points

Once a year contestants from multiple countries gather to compete in the Best Olympiad in Informatics. Besides the competition, guests have an opportunity to visit local museums and landmarks. This year there will be an art exhibition specially made for the contestants and to appeal to such an audience every picture will be a collection of points with integer coordinates.

The coordinates of the points in every picture are already decided on and what's left is to print the pictures out. However, printing them on normal rectangular canvas is wasteful as a large part of the paper might not contain any points at all. To make the exhibition more eco-friendly, every canvas shall be a four-sided polygon with the top and bottom sides completely horizontal. The canvas must contain all points, but at the same time it must be as small as possible.

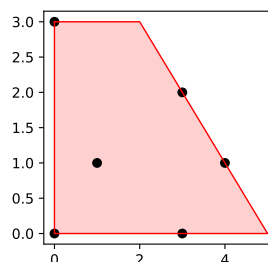
Your job is to write a program that outputs the minimum possible area of the canvas. Note that any side of the canvas can be infinitely small, making the canvas look like a triangle, line or even a point (in the last two cases the area is zero).

Input. The first line of the file `piltsis.txt` contains the number of points N ($1 \leq N \leq 10^5$). The next N lines contain two numbers each: the coordinates x_i and y_i of point i , in picometers ($-10^8 \leq x_i, y_i \leq 10^8$).

Output. On the only line of the file `piltval.txt` output the minimum possible area of the canvas. Your answer will be considered correct if it doesn't differ from the true answer by more than 0.0001%.

Example.

<code>piltsis.txt</code>	<code>piltval.txt</code>
6	10.5
0 3	
1 1	
4 1	
3 0	
3 2	
0 0	



Example.

<code>piltsis.txt</code>	<code>piltval.txt</code>
1	0
20 18	

In the first test, the bottom side is 5, top is 2 and the height is 3, hence the area is $\frac{3}{2}(5+3) = 10.5$.

As the second test contains only one point the canvas can be arbitrary small and so the answer is zero.

Grading.

- In tests worth 20 points it holds that $N \leq 20$ and $-1000 \leq x_i, y_i \leq 1000$ for every i .
- In tests worth additional 20 points it holds that $N \leq 1000$.