Polygon

A simple polygon with N vertices is drawn on an infinite rectangular grid. For such a polygon, only neighboring edges touch at their common vertex; no other of its edges intersect or touch. All vertices of the polygon lie on grid points, i.e., vertices have integer coordinates.

Your task is to find the total length of grid line segments which lie strictly inside the given polygon (these line segments are highlighted in the drawings below).

Input

The first line of input contains a single integer N, the number of vertices of the polygon. Each of the following N lines contains two integers x and y, the coordinates of one vertex. The vertices are given either in clockwise or counterclockwise order. All vertices are distinct, but more than two consecutive vertices may lie on a line.

Output

The only line of output must contain a decimal number: the total length of grid line segments which lie strictly inside the given polygon.

Constraints

$3 \leq N \leq 100\,000$
$-500\,000\,000 \leq x, y \leq 500\,000\,000$
In test cases worth 50 points, all polygon edges lie on grid lines.

Grading

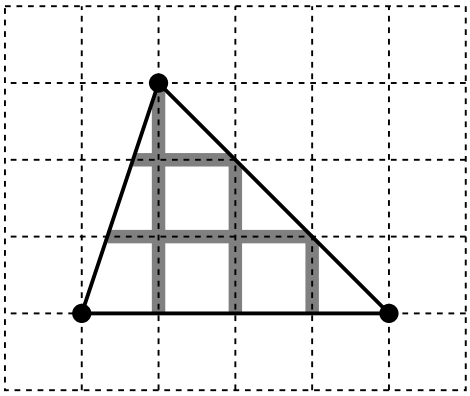
Your output is graded correct if it is close enough to the expected output.

To be more precise: Let your output number be L, and let the expected result be R. Then, at least one of the two following conditions must hold:

- $|L - R| \leq R \cdot 10^{-6}$ *(relative precision)*
- $|L - R| \leq 10^{-6}$ *(absolute precision)*

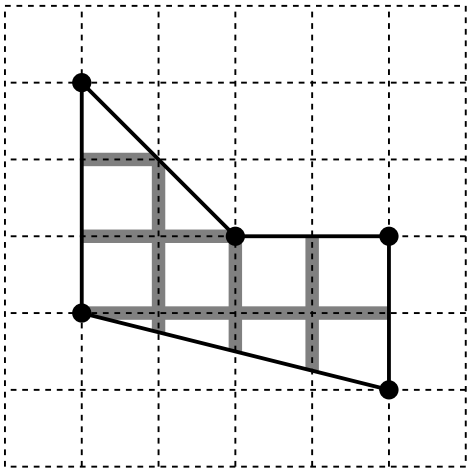
Examples

Input	Output
3 5 1 2 4 1 1	10.0



The length of horizontal lines is $4/3 + 8/3 = 4$. The length of vertical lines is $3 + 2 + 1 = 6$. The total length is $4 + 6 = 10$.

Input	Output
5 0 0 -2 2 -2 -1 2 -2 2 0	12.5



The length of horizontal lines is $1 + 2 + 4 = 7$. The length of vertical lines is $9/4 + 3/2 + 7/4 = 5.5$. The total length is $7 + 5.5 = 12.5$.