D. Ksusha and Square

Ksusha is a vigorous mathematician. She is keen on absolutely incredible mathematical riddles.

Today Ksusha came across a convex polygon of non-zero area. She is now wondering: if she chooses a pair of distinct points uniformly among all integer points (points with integer coordinates) inside or on the border of the polygon and then draws a square with two opposite vertices lying in the chosen points, what will the expectation of this square's area be?

A pair of distinct points is chosen uniformly among all pairs of distinct points, located inside or on the border of the polygon. Pairs of points p, q $(p \neq q)$ and q, p are considered the same.

Help Ksusha! Count the required expectation.

Input

The first line contains integer n $(3 \leq n \leq 10^5)$ — the number of vertices of Ksusha's convex polygon. Next n lines contain the coordinates of the polygon vertices in clockwise or counterclockwise order. The i-th line contains integers x_i, y_i $(|x_i|, |y_i| \leq 10^6)$ — the coordinates of the vertex that goes i-th in that order.

Output

Print a single real number — the required expected area.

The answer will be considered correct if its absolute and relative error doesn't exceed 10^{-6}.

Examples

input
3 0 0 5 5 5 0

output
4.6666666667

input
4 -1 3 4 5 6 2 3 -5

output
8.1583333333

input
3 17 136 859 937 16 641

output
66811.3704155169