Symmetric Boundary

Input file:	`standard input`
Output file:	`standard output`
Time limit:	11 seconds
Memory limit:	1024 megabytes

Symmetrical figures are beautiful—and they are the subject of this task. A region in a 2D plane is *convex* if, for every pair of points p and q in the region, the segment connecting p and q is entirely included in the region. Also, a region in a 2D plane is *point-symmetric* if, when you rotate the region by 180 degrees around a certain point, the rotated region exactly matches the original region.

You are given a convex polygon in a 2D plane with n vertices, numbered from 1 to n in counterclockwise order. Vertex i has coordinates (x_i, y_i). No three vertices are collinear. Determine whether there exists a convex, point-symmetric region containing all of the n vertices on its boundary. If one or more such regions exist, compute the minimum area among all of them.

Input

The first line of input contains one integer n ($3 \leq n \leq 30$). Each of the next n lines contains two integers. The i-th line contains x_i and y_i ($0 \leq x_i, y_i \leq 1000$).

It is guaranteed that the given polygon is convex, its vertices are given in counterclockwise order, and no three of its vertices are collinear.

Output

If one or more such regions exist, output the minimum area among all of them. The relative error of the output must be within 10^{-9}.

If such a region does not exist, output `-1` instead.

Examples

standard input	standard output
4 0 0 10 0 8 9 4 9	90.0
8 8 10 2 9 0 8 0 2 2 0 8 0 10 2 10 8	-1
6 231 77 359 20 829 124 998 461 941 735 879 825	486567.9669655848

Note

Explanation for the sample input/output

Figure 1 illustrates the vertices in the sample input as black dots. For sample inputs #1 and #3, the shaded regions represent the regions with the minimum possible area.

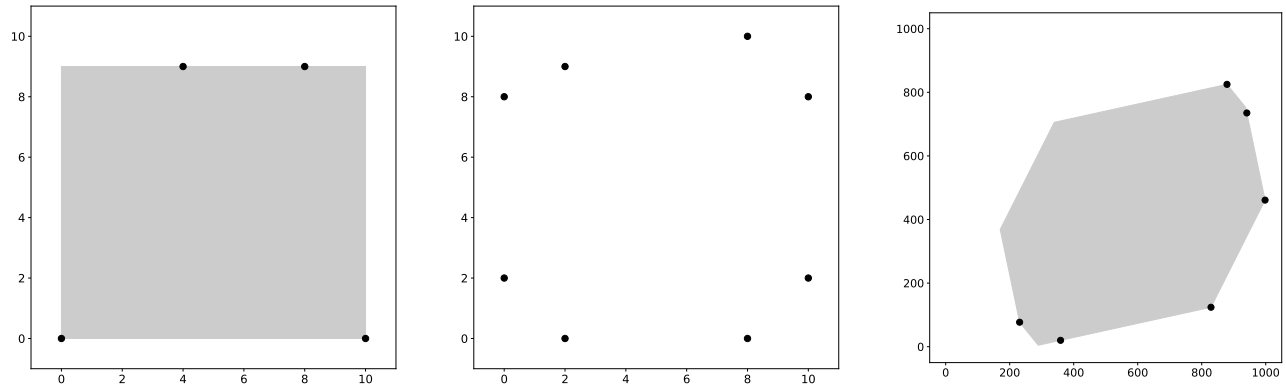

Рис. 1: Illustrations of the sample inputs (from left to right).