

2circles

100 points

Source code: `2circles.c`, `2circles.cpp`, `2circles.pas`

Input file: `2circles.in`

Output file: `2circles.out`

Time limit: 4 seconds

Memory limit: 64MB

Task

We will consider a convex polygon with N vertices. We wish to find the maximum radius R such that two circles of radius R can be placed entirely inside the polygon without overlapping.

Description of input

The first line of input contains the number N . Each of the next N lines contains a pair of integers x_i, y_i – representing the coordinates of the i^{th} point, separated by space.

Description of output

You should output a single number R – the desired radius. Output R with a precision of 3 decimals. You will pass a test if the output differs from the true answer by at most 0.001.

Constraints

- $3 \leq N \leq 50000$
- $-10^7 \leq x_i \leq 10^7$
- $-10^7 \leq y_i \leq 10^7$
- The points are given in trigonometric (anti-clockwise) order.
- For 10% of tests $N = 3$
- For 40% of tests $N \leq 250$

Example

2circles.in	2circles.out	Explanation:	
<pre>4 0 0 1 0 1 1 0 1</pre>	0.293	The maximum radius is obtained when the centers of the two circles are placed on one of the square's diagonals. The radius can be calculated exactly and it is: $\frac{\sqrt{2}}{2 * (1 + \sqrt{2})} \approx 0.293$	



2circles.in	2circles.out	2circles.in	2circles.out
4	0.500	6	2.189
0 0		0 0	
3 0		8 0	
3 1		8 6	
0 1		4 8	
		2 8	
		0 4	