

Problem K

Shrinking polygons kit

A *Shrinking polygons kit* is a tool used a lot in geometric magic classes at Nlogonia. The *kit* consists of two points, A and B in the cartesian plane. Consider a convex polygon vertices given by $1, 2 \dots N$, in that order. To shrink this polygon using the *kit*, some rules should be followed. Each vertex x of the polygon should be moved once: To the midpoint of the segment Ax or the midpoint of the segment Bx . The shrinking procedure should produce a new convex polygon that preserves the order of the vertex on the original polygon. In other words, considering all possible ways to apply the kit, only those where the final sequence of vertices is $1, 2 \dots N$ representing a convex polygon are valid. Note the original convex polygon vertices can be on clockwise order and a valid shrink operation can produce a convex polygon in counter-clockwise vertices order. Only the relative order of the points is important, not the direction.

It is known that geometrical magic is not the forte of most students. The teacher asked them to use the *kit* to shrink a convex polygon to obtain the smallest possible area. A friend has begged you to solve the problem for him. Answer the smallest possible area of the given polygon.

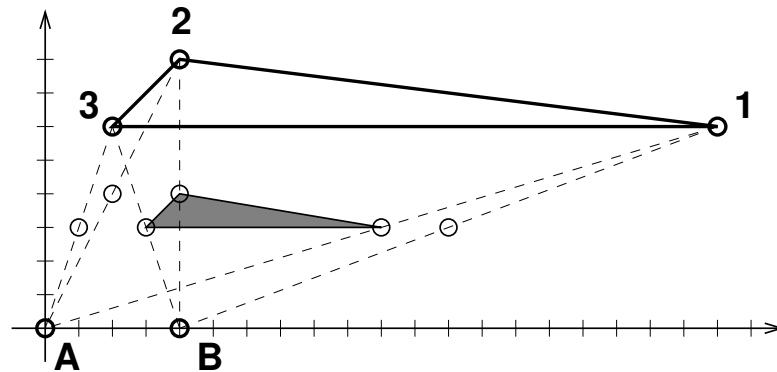


Figure above shows a valid use of the *kit*, where the shaded polygon is the smallest possible area that preserves the sequence of vertices. Points A and B correspond to the points of the *kit*. Note that, despite the name *shrink* sometimes you can use the *kit* to increase the area of the polygon! As geometry is hard!

Note that a single point or a line are not considered polygons. Thus, if a use of the *kit* produces as a result something other than a convex polygon then it is not a valid use of the *kit*.

Input

The input contains several test cases. In each test case, The first line of input contains an integer number N ($3 \leq N \leq 10^5$), the number of vertices in the polygon. Next N lines, each contains two integer numbers x, y ($-10^6 \leq x, y \leq 10^6$), the polygon vertices. The list line of input contains four integer numbers, A_x, A_y, B_x e B_y ($-10^6 \leq A_x, A_y, B_x, B_y \leq 10^6$), the coordinates x and y for A and the coordinates x and y for B , respectively. The points on the input will be given in the order they are on the polygon, clockwise or anti-clockwise way. There will be no repeated points on the convex polygon.

Output

For each test case in the input, Print a real number with 3 decimal places of precision, representing the smallest area possible for a polygon obtained using the *kit*.

Examples

Input	Output
3	3.500
20 6	1.000
4 8	2.000
2 6	
0 0 4 0	
3	
0 4	
4 4	
0 0	
3 -2 -3 -2	
3	
0 4	
4 4	
0 0	
2 -2 -2 -2	