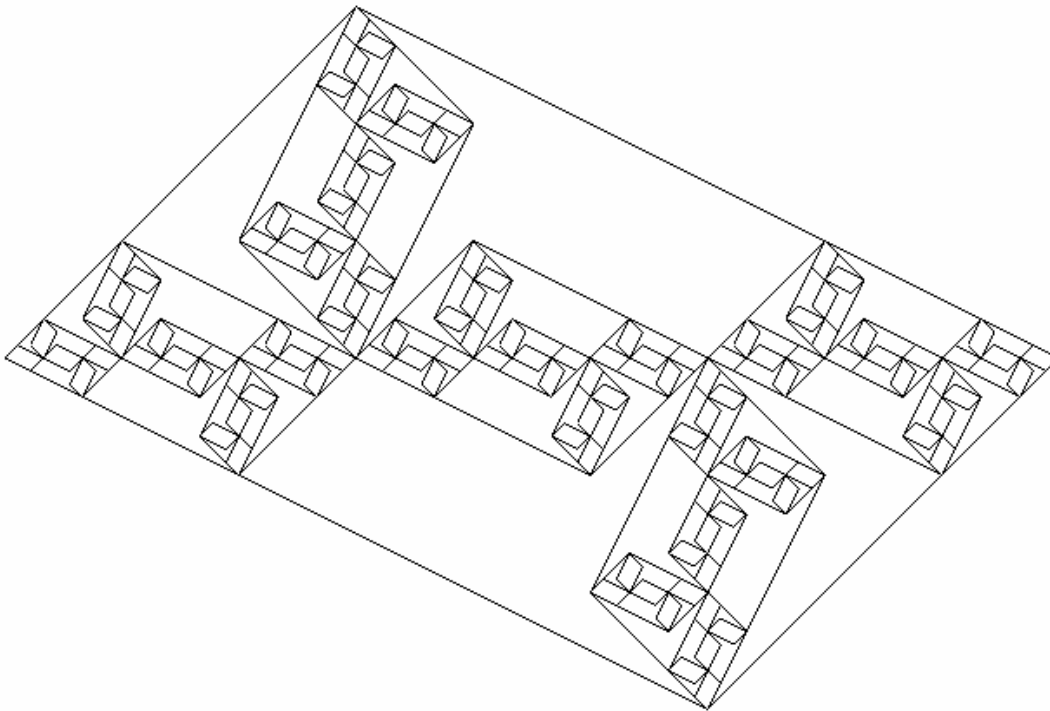


# Problem F

## Two Points and Curious MumboJumbo

**Input:** Standard Input  
**Output:** Standard Output

Given two points  $a$  and  $b$  on a two dimensional plane, a curious mind can play many curious games. One such curious game would be to draw two pairs of parallel lines through these points, the first pair being inclined at an angle of  $\theta_1$  and the second pair being inclined at an angle of  $\theta_2$  with  $ab$ , resulting in a parallelogram. Let the other two points on the parallelogram be  $c$  and  $d$  such that  $c$  is the one lying on left hand side when looking at  $b$  from  $a$ . So now we have the parallelogram  $acbd$  having diagonals  $ab$  and  $cd$ . Now the mathematical mind sees that it has discovered an interesting way of constructing parallelograms from a pair of points and decides to name this operation mumbo and happily defines a notation for this operation  $mumbo(a,b)$ . Note that the parallelograms produces by  $mumbo(a,b)$  and  $mumbo(b,a)$  for any two points on the plane have same shape but different orientation.



To take the game a little farther, the mathematical mind divides the diagonal  $ab$  into three equal parts  $ae$ ,  $ef$  and  $fb$ . Joining  $e$  with  $c$  and  $f$  with  $d$  produces a strange picture that farther increases the curiosity of the mathematical mind. To satisfy its curiosity the mind decides to apply the operation mumbo on these 5 line segment. The result after applying  $mumbo(a,e)$ ,  $mumbo(e,f)$ ,  $mumbo(f,b)$ ,  $mumbo(e,c)$  and  $mumbo(f,d)$  is an even strange picture showing five smaller parallelograms inside the initial larger parallelogram. All six of the parallelograms have similar shape but some has different orientation and they have same size except for the initial one which in fact contains all the other parallelograms inside itself. Happily, the mind names this operation of producing smaller parallelograms of same shape jumbo. The notation for this operation is  $jumbo(a,d,b,c)$  where  $a,d,b$  and  $c$  are the vertices of the parallelogram in counter clockwise order.

The mind takes the game even farther by recursive mumbo jumbo many times, resulting in a very

strange picture consisting of parallelograms of same shape but different sizes and orientations. Now, to satisfy the ultimate curiosity, for any two points  $P_1$  and  $P_2$  on the plane, the mind wants to know the area of the smallest parallelogram not containing any other parallelogram that contains both of these points. To keep things simple, mind has decided that  $\theta_1$  should be the angle  $\angle cab$  and always be  $\tan^{-1}(1)$  and  $\theta_2$  should be the angle  $\angle abd$  and always be  $\tan^{-1}(1/2)$ .

## Input

There will be multiple test cases, each on a separate line. Each line will contain eight floating point numbers  $Xa, Ya, Xb, Yb, Xp1, Yp1, Xp2, Yp2$  denoting coordinates of  $a, b, p1$  and  $p2$  respectively. Here  $a$  and  $b$  are the points to start mumbo jumbo with. You can assume that  $p1$  and  $p2$  will be distinct and at least  $10^{-6}$  units apart.

## Output

For each line of input, your program should produce a line of output consisting of a single floating point number having four digits after decimal point denoting the area of the smallest parallelogram produced by mumbo jumbo which contains both  $p1$  and  $p2$  but does not contain any other parallelogram that contain both of these points. If either or both of the points are outside of the parallelogram, the print -1 as output. If a point lies exactly on a vertex of a parallelogram then the point is considered to be inside the parallelogram.

### Sample Input

### Output for Sample Input

0 0 81 0 9 1 9 9	27.0000
0 0 81 0 27 0 27 13.5	243.0000
0 0 81 0 27 0 27 13.5	243.0000
0 0 81 0 0 0 300 3	-1
0 0 81 0 3 0 3 3	3.0000

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Special Thanks to: Md. Arifuzzaman Arif