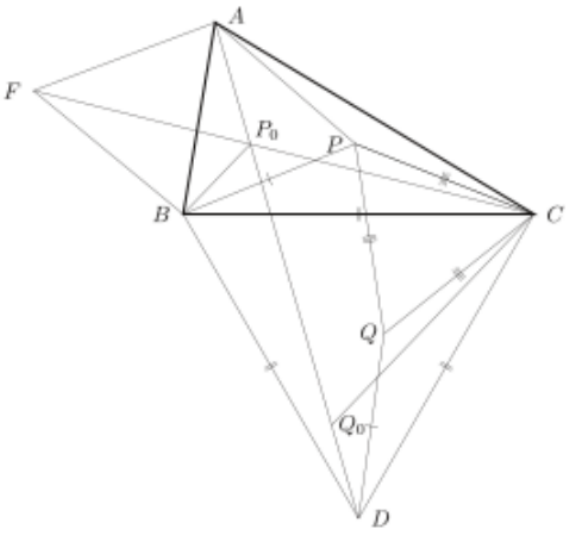
5102 Fermat Point in Quadrangle

In geometry the Fermat point of a triangle, also called Torricelli point, is a point such that the total distance from the three vertices of the triangle to the point is the minimum. It is so named because this problem is first raised by Fermat in a private letter. In the following picture, P_0 is the Fermat point. You may have already known the property that:



$$\angle AP_0B = \angle BP_0C = \angle CP_0A = 120^o$$

Alice and Bob are learning geometry. Recently they are studying about the Fermat Point.

Alice: I wonder whether there is a similar point for quadrangle.

Bob: I think there must exist one.

Alice: Then how to know where it is? How to prove?

Bob: I don't know. Wait... the point may hold the similar property as the case in triangle.

Alice: It sounds reasonable. Why not use our computer to solve the problem? Find the Fermat point, and then verify your assumption.

Bob: A good idea.

So they ask you, the best programmer, to solve it. Find the Fermat point for a quadrangle, i.e. find a point such that the total distance from the four vertices of the quadrangle to that point is the minimum.

Input

The input contains no more than 1000 test cases.

Each test case is a single line which contains eight float numbers, and it is formatted as below:

x_1 y_1 x_2 y_2 x_3 y_3 x_4 y_4

x_i, y_i are the x- and y-coordinates of the i-th vertices of a quadrangle. They are float numbers and satisfy $0 \le x_i \le 1000$ and $0 \le y_i \le 1000$ $(i = 1, \cdots, 4)$.

The input is ended by eight '`-1`'.

Output

For each test case, find the Fermat point, and output the total distance from the four vertices to that point. The result should be rounded to four digits after the decimal point.

Sample Input

```
0 0 1 1 1 0 0 1
1 1 1 1 1 1 1 1
-1 -1 -1 -1 -1 -1 -1 -1
```

Sample Output

```
2.8284
0.0000
```