North American Invitational Programming Contest 2018

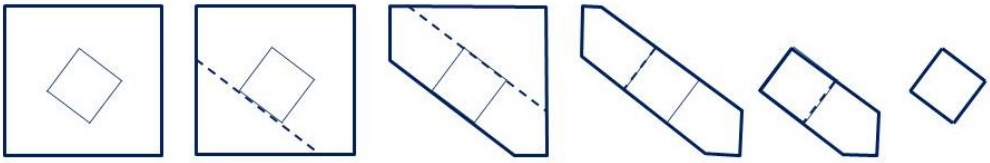
March 24, 2018

Hosted by: THE UNIVERSITY OF CHICAGO

Problem A
Cut It Out!

You are given two convex polygons A and B. It is guaranteed that B is strictly contained inside of A.

You would like to make a sequence of cuts to cut out B from A. To do this, you draw a straight line completely through A that is incident to one of the edges of B, which separates A into two pieces. You cut along this line and discard the piece that doesn't contain B. You repeat this until the piece that you have left is exactly B.



The cost of making a cut is equal to the length of the cut (i.e. the length of the line through the remainder of A). Given A and B, find the minimum cost needed to cut B out.

Input

Each input will consist of a single test case. Note that your program may be run multiple times on different inputs. Each test case will begin with a line containing a single integer a ($3 \leq a \leq 200$), which is the number of points in polygon A. Each of the next a lines will contain two integers x and y ($-10^6 \leq x, y \leq 10^6$), which are the vertices of polygon A, in clockwise order. It is guaranteed that polygon A will be convex.

The next line will contain a single integer b ($3 \leq b \leq 200$), which is the number of points in polygon B. Each of the next b lines will contain two integers x and y ($-10^6 < x, y < 10^6$), which are the vertices of polygon B, in clockwise order. It is guaranteed that polygon B will be convex. It is also guaranteed that polygon B will reside entirely within the interior of polygon A.

No three points, within a polygon or across polygons, will be collinear.

Output

Output a single floating point number, which is the minimum cost to cut B out of A. To be considered correct, this number must be within a relative error of 10^{-6} of the judges' answer.

Sample Input 1	Sample Output 1
4 0 0 0 14 15 14 15 0 4 8 3 4 6 7 10 11 7	40.0000000000

Sample Input 2	Sample Output 2
4 -100 -100 -100 100 100 100 100 -100 8 -1 -2 -2 -1 -2 1 -1 2 1 2 2 1 2 -1 1 -2	322.1421356237