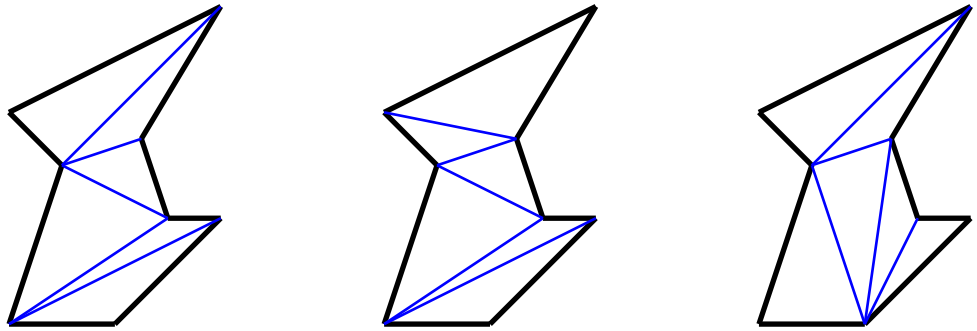
Cheapest triangulation P65751_en

Given a simple polygon with n vertices, there is always at least one way to decompose it in triangles by adding $n - 3$ diagonals. For instance, these are three of the many triangulations of the same polygon:



Define the cost of a triangulation as the sum of the lengths of the diagonals that have been added. Given a *convex* polygon, what is the cost of its cheapest triangulation?

Input

Input consists of several cases. Every case begins with n. Follow n pairs of real numbers x y giving the coordinates of the points of the polygon, either in clockwise or in anticlockwise order. Assume $3 \leq n \leq 100$.

Output

For every given polygon, print the cost of its cheapest triangulation with four digits after the decimal point. The input cases have no precision issues.

Sample input	Sample output
3 0 0 0 1 1 0 4 0 0 2 0 2 2 0 1 5 -1.2 3 0 4 1 2.7 1 -1 0 -0.5	0.0000 2.2361 5.5730

Problem information

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