

Competitive Programming SS24

Submit until end of contest



Problem: Ball Control (1 second timelimit)

You are the new coach of your national soccer team.

You have developed a strategy that almost guarantees victory in every match. Goals are usually conceded when the opposing team has possession of the ball. Therefore, if your team always has the ball, the other team cannot score. Loss of possession often happens during passes between players. Your objective: achieve 100% pass accuracy.



A pass about to be intercepted.
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At the base camp, your first directive is to cancel all other training activities except for passing drills. You instruct your team to form a circle, but they are positioned more widely apart than anticipated. Still, the players' positions can be represented as vertices of some convex polygon. Now, each player needs a partner to pass to, and the passing distance between them is measured as the Euclidean distance between their positions. It is well-known that longer passes have a higher risk of interception. Therefore, to maximize the training's effectiveness, you aim to pair up the players in such a way that the total passing distance is maximized.

Given the positions of the players, determine the maximum total passing distance that can be achieved.

Input The input consists of:

- One line with an integer n ($4 \leq n \leq 10^5$, n is even), the number of players in the national team.
- n lines, the i th of which contains two integers x_i and y_i ($-10^9 \leq x_i, y_i \leq 10^9$), the position of the i th player.

The positions of the players are pairwise distinct. Furthermore, it is guaranteed that the positions form a **strictly convex** polygon. That is, any line segment connecting two distinct points on the polygon is entirely contained within the polygon, and none of the given positions lies on a segment between two other positions. Additionally, the positions are listed in counter-clockwise order of transversal of said polygon.

Output Output the maximum total passing distance. Your answer should have an absolute or relative error of at most 10^{-6} .

Sample Input 1

```
4
-1 -1
-2 -1
-2 -2
-1 -2
```

Sample Output 1

```
2.82842712474619009753
```

Sample Input 2

```
4
1 1
2 1
3 2
1 2
```

Sample Output 2

```
3.65028153987288474518
```