

Collect Diamonds

Misty has won a contest in a jewellery store and now she is allowed to collect diamonds as prize. But the store manager doesn't want to be so generous. He has spread several diamonds on the floor and now he asks Misty to encircle them using her gold chain. After that she can exchange her chain with all the diamonds that are encircled. Misty can manage to get the gold chain of any length from her friends. But she has to minimise the length and also want to collect all the diamonds on the floor. Diamonds lying on the chain are also considered to be inside. Help her to find the minimum length of the gold chain required.

Input

First line of input consist of a single positive integer $n \leq 1000$ i.e number of diamonds. Next n lines consist of two integers x,y that denotes position (coordinates) of diamonds on the floor. $0 \leq x,y \leq 1000$

Output

Minimum length of gold chain required so that misty can collect all the diamonds. Answer should be rounded to two places after decimal.

Example

Input:

```
4
1 0
0 1
1 1
0 0
```

Output:

```
4.44
```