HW1 - Best Friend Forever
Time limit: 15 seconds
Memory limit: 256 megabytes
Last updated on: March 18, 2023

Problem Description

The famous bartender Tozy and his best friend Chef Power are planning to start a business in the same city.

Tozy wants to have an affordable Boba shop, while Chef Power wants to open a restaurant featuring the finest crispy pork belly.

Since they both want to offer their customers the best city view, they have decided to look for rooftop locations in the city.

Moreover, because of their strong friendship, they want to ensure that the distance between their shops is as short as possible.

As their mutual friend Stanlily, a.k.a the 500KG TopGod, you happen to have the information about all the possible locations.

Figure 1: Some random figures.

Can you help them with this problem?

Input Format

On the first line, there is a single integer T ($T \le 10$) denoting the number of test cases.

The first line of each test case contains an integer n ($2 \le n \le 100,000$) denoting the number of locations.

Then n lines followed, each line containing 2 real numbers x_i, y_i ($-10,000 \le x_i, y_i \le 10,000$) denoting the position of i-th location (x_i, y_i).

There are no 2 locations at the same position, which means no i, j satisfy $x_i = x_j$ and $y_i = y_j$.

Output Format

For each test case, output the distance of the closest 2 locations. Your answer will be accepted if the absolute error or the relative error is less than 10^{-4}.

Sample Input

```
3
3
0 0
0 1
1 0
4
6 4
9 2
8 7
3 9
5
7.377359 3.113089
8.899004 4.047913
3.929112 9.695250
8.377879 7.799725
5.508218 2.498832
```

Sample Output

```
1.000000
3.605551
1.785861
```

Note

The distance between 2 points (x_1, y_1) and (x_2, y_2) is defined by $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$.

- $n \le 100$ for 20% of test cases

- $n \leq 1,000$ for 40% of test cases

- $n \leq 10,000$ for 60% of test cases

- $n \leq 100,000$ for 100% of test cases