

HW1 - Lycoris Recoil EP14

Time limit: 15 second

Memory limit: 256 megabytes

Last updated on: October 8, 2022

Problem Description

You are the top secret agent in the top secret agency called "Direct Attack", whose job is to arrest bad guys without killing them. It could have been quite tricky, but luckily you have the power to dodge bullets (though that's not within the scope of this problem).

One day, a bad guy smuggled a pile of guns into the country and spreads them in the streets. Therefore you and your partner are given the positions of the smuggled guns and sent to recover them as soon as possible.



During the mission, your trusty hacker friend Walnut finds a wired pattern in the guns' positions and is convinced the bad guy is located at the closest pair of guns.



In order to catch the bad guy, please find the closest distance between 2 guns.

Input Format

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

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

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

There is no 2 spots at 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 spots. 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 $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$.

- $n \leq 100$ 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