HW1 - Mountain Biker

Time limit: 15 seconds
Memory limit: 256 megabytes
Last updated on: September 27, 2023

Problem Description

Once upon a time in Taiwan, there was a famous motorbike rider loved by many on social media. People followed this rider eagerly to see their exciting trips.

On social media, the rider shared cool photos taken by photographers scattered on twisty mountain roads. These pictures showed the rider doing amazing stunts and exploring beautiful places.

To get even more followers, the rider came up with a plan. He wanted to find the two photographers closest to each other and kept riding between them to take more photos. But first, He needed to figure out who those two photographers were and how far apart they were.

Help the rider find the two closest photographers and measure the distance between them. Remember, there's a time limit of just 15 seconds, and they can't use more than 256 megabytes of memory. It's a race against time to capture amazing moments and gain more fans!

Input Format

The input consists of the following:

- The first line contains a single integer, T ($T \leq 10$), indicating the number of test cases.
- For each test case:
  - The first line contains an integer, n ($2 \leq n \leq 100,000$), which represents the number of photographer locations.
  - The next n lines each contain two real numbers, x_i and y_i ($-10,000 \leq x_i, y_i \leq 10,000$), denoting the positions of the i-th photographer as coordinates (x_i, y_i).
  - It is guaranteed that no two photographers share the same position, meaning that there are no i and j values such that $x_i = x_j$ and $y_i = y_j$.

Output Format

For each test case, you should output a single real number, which represents the distance between the two closest photographer 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 $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$.

- $n \leq 100$ 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