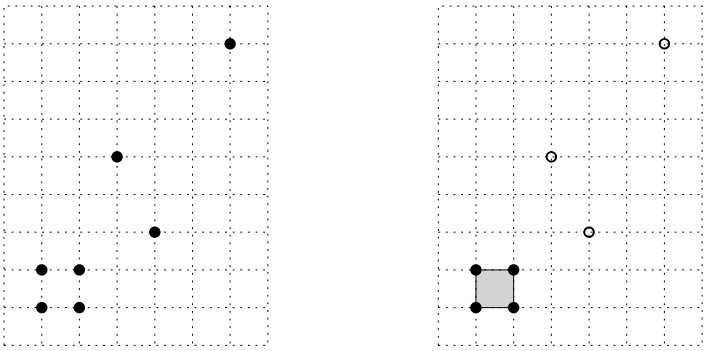
Problem 3

Data can be often represented as points in space with their attributes. You are given N points in the plane representing a certain set S of data. While processing the data set S, by mistake, several fake points have been added into the data set S. A more careful investigation reports that the number of fake points added into S is exactly three; that is, N – 3 points of S are real data but three points in S are fake.

The following procedure describes the way to extract out the three fake points from S. (We may not always find all three fake points if some of them are completely mixed with real points..)

1. Find an axis-parallel square B of smallest size containing at least N – 3 points of S
2. Report the points that are not contained in B as "fake."

Notice that such a square B described above may not be uniquely determined but their smallest size, even if there are many of those, is uniquely determined.



See the above figures. There are 7 points in the left figure. Performing the above procedure results in a square of side length one containing N – 3 = 4 points as shown in the right figure, and the rest three points (marked as small empty circles) are distinguished as fake.

Your program is to print out the side length of the square B containing at least N – 3 points among N given points in the plane.

[Input]

The first line of the input file contains the number T of test cases in the file. In each test case, the first line has one integer N (the number of points, 5 ≤ N ≤ 100,000). In the next N lines, the N points are given. Each point is represented by two integer coordinates. Each coordinate is between -100,000,000 and 100,000,000.

Because of the large size of the input files, it is likely required that the fastest I/O functions for the programming language of your choice to be used.

There are two kinds of inputs listed as follows.

- Small Set: T ≤ 100, 5 ≤ N ≤ 1,000
- Large Set: T ≤ 100, 5 ≤ N ≤ 100,000

[Output]

Print one line for each test case. In the line you should print an integer, representing the smallest side length of a square B that contains at least N – 3 points among the N points of the test case.

[I/O Example]

Input

```
2
7
0 0
0 1
1 0
1 1
2 4
5 7
3 2
10
0 0
-1 2
3 4
4 3
-3 -2
2 -1
1 1
-1 1
2 1
0 1
```

Output

```
1
3
```