6902 Three Squares

A square is called axis-parallel if its sides are vertical or horizontal, and two squares are said to be congruent if their side lengths are equal. You are given a set P of n points in the plane. Any real number $x \geq 0$ is called *3SQ-sufficient* for P if there exist three congruent axis-parallel squares of side length x such that the union of the three squares contains all points in the set P. If a square has side length zero, it is degenerated to a point, so you can consider a point itself as a square of side length zero. Your program is to find the smallest 3SQsufficient number for a given input set P of points.

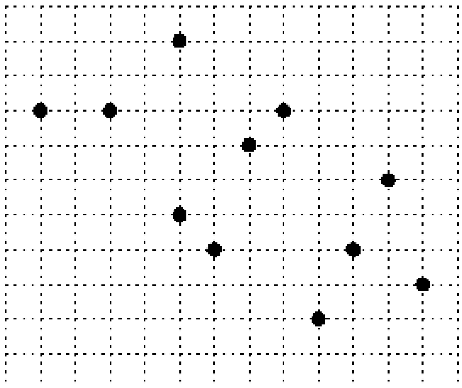
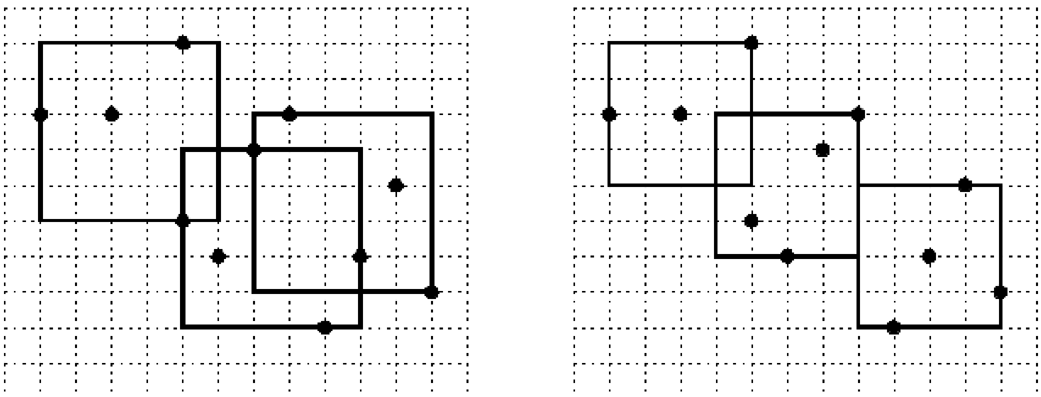


Figure 1. 11 points in the plane

For example, let P be the set of 11 points in the plane as shown in Figure 1. Then, one can find three congruent axis-parallel squares of side length 5 whose union contains all these 11 points in the set P, as shown in Figure 2(a). This means that number 5 is 3SQ-sufficient for this set P of 11 points. Notice that points on the boundary of a square are considered to be contained in the square.



(a) **(b)**

Figure 2. Two numbers 5 and 4 are 3SQ-sufficient

You can find an even smaller 3SQ-sufficient number for this case; there exist three axis-parallel squares of side length 4 whose union contains all the 11 points as illustrated in Figure 2(b). More effort to find a further smaller 3SQ-sufficient number will be however worthless because number 4 is in fact the smallest 3SQsufficient number for this set P. Therefore, if these 11 points of Figure 1 are given as input of your program, then your program must output 4 as the answer.

Input

Your program is to read from standard input. The input consists of T test cases. The number of test cases T is given in the first line of the input. Each test case starts with a line containing an integer, n ($1 \leq n \leq 100,000$), where n is the number of points in the data set P. In the following n lines, each of the n points in P is given line by line. Each point is represented by two numbers separated by a single space, which are the x-coordinate and the y-coordinate of the point, respectively. Each coordinate is given as an integer between -1,000,000,000 and 1,000,000,000, inclusively. Note that there may be two or more points having the same coordinates in the input data set P.

Output

Your program is to write to standard output. Print exactly one line for each test case. The line should contain an integer representing the smallest 3SQ-sufficient integer for a given input set P of points.

The following shows sample input and output for three test cases.

Sample Input

```
3
5
1 0
0 1
5 2
2 3
3 2
11
1 8
3 8
5 5
5 10
6 4
7 7
8 8
9 2
11 6
12 3
10 4
4
1 1
2 8
-21 45
1 1
```

Sample Output

```
1
4
0
```