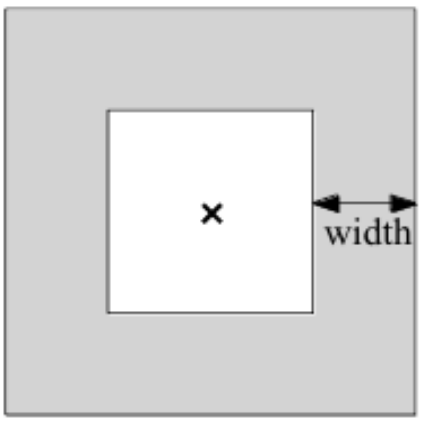
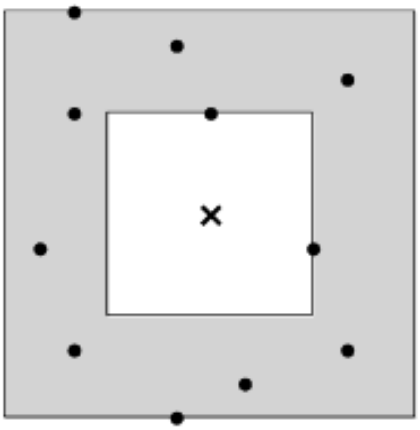
6121 Square Annulus

A *square annulus* is the planar shape contained between two concentric axis-parallel squares, i.e., two squares with a common center whose sides are parallel to the x- and y-axes. More precisely, it means the area inside the bigger square but outside the smaller one, including their boundaries. The *width* of a square annulus is defined to be half the difference of the side lengths of its two squares. See the left figure below, in which a square annulus is depicted as gray region with the center marked by $\times$.





You are given N points in the plane and you have to find a square annulus **A** of minimum width that contains all the N given points. The right figure above shows an example of a square annulus of minimum width containing all given points (marked by dots).

Your program is to compute the width of a square annulus **A** that contains all the N given points. You can exploit the following fact, which has been shown by a German research group:

*There exists a square annulus **A** of minimum width containing N given points such that its bigger square is a smallest axis-parallel square containing the N points.*

Because the bigger square S of **A** must contain all the N points, the above fact means that S can be assumed to have the minimum side length among all axis-parallel squares containing the N points; in other words, if L is the side length of S, then there is no axis-parallel square containing the N points with side length smaller than L.

Remark that there can be many such squares of the same side length with S containing the given points. Also, note that the width of **A** can be zero when the two squares defining A are the same; or, the smaller square of **A** may have side length zero, so the width of **A** can be as large as half the side length of its bigger square.

Input

Your program is to read from standard input. The input consists of T test cases. The number T of test cases is given in the first line of the input. From the second line, each test case is given in order, consisting of the following: a test case contains an integer N ($1 \leq N \leq 100,000$), the number of input points, in its first line, and is followed by N lines each of which consists of two integers inclusively between -1,000,000 and 1,000,000, representing the x- and y-coordinates of a point in the plane. Two consecutive integers in one line are separated by a single space and there is no empty line between two consecutive test cases.

Output

Your program is to write to standard output. Print exactly one line for each test case. The line should contain a single value, representing the minimum width of an axis-parallel square annulus **A** containing the input points. The value to be printed should consist of the whole integer part of the computed width, a decimal point, and exactly one digit after the decimal point. So, if necessary, you should round off the computed width to one decimal place.

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

Sample Input

```
2
11
-2 -2
1 -4
3 -3
6 -2
5 1
6 6
2 5
-3 1
-2 5
-2 8
1 7
12
-11 0
15 -4
10 -13
5 -12
-4 19
0 17
8 30
-10 -23
-9 -17
6 27
-8 23
-11 -8
```

Sample Output

```
3.0
13.5
```