Algorithms Lab

Exercise 4 – *Almost Antenna*

After the invention of radio, Theirland wants to demonstrate its technological superiority and builds a first radio transmitter. The transmitter is characterized by a location and a transmission radius (within which a reception of the signal is guaranteed). Not surprisingly, transmitters with a higher radius require more advanced technology and more time to build and—last but not least—they cost much more. Unfortunately the budget situation is rather tight and the financial department works hard to cut down on the costs. As a compromise it has been agreed upon that not the whole population needs to be covered but a single outlier without reception is acceptable. Now the calculations have to be done all over again. . .

Input The input contains several test cases. Each of them begins with a line containing one integer n ($1 \leq n \leq 200'000$), denoting the number of citizens. The next n lines contain coordinates x_i y_i of homes of citizens (x_i, y_i integral with $|x_i|, |y_i| < 2^{48}$). All numbers on a single line are separated by a single space. The input is terminated by a single line containing 0 (i.e., an empty testcase).

Output For each input, write on a single line the smallest integral transmission radius needed to cover all but at most one citizen.

Sample Input

```
2
1 7
31 −6
5
0 0
1 0
2 0
3 0
4 0
0
```

Sample Output

```
0
2
```