

## Algorithms Lab

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### Exercise – *Graypes*

The forests of Grayland are inhabited by a unique species developed from apes, called graypes. Apart from many biological differences, which have been puzzling zoologists during recent years, graypes also exhibit a very specific social behavior. If a graype is in a difficult situation or if it is afraid of something, it seeks company of another graype. In other words, it simply runs toward the nearest graype so they can solve the problem or fight the danger together. For a long time scientists have been monitoring the migration of graypes caused by this phenomenon.

One day, an earthquake struck Grayland. This caused a huge chaos and massive migration of graypes from one place to another. Moni Torer, a scientist at GPL, the Graype Positioning Lab, observed that all graypes ran at the same speed of  $1\text{m/sec.}$  Soon after, the lab members started betting at which time the first graype will reach its company...

**Input** The input contains several test cases. Each of them begins with a line containing one integer  $n$  ( $2 \leq n \leq 100'000$ ), denoting the number of graypes. The next  $n$  lines describe the current position of all graypes, measured in meter. Each position is defined by two integer coordinates  $x$ , and  $y$ , separated by space, with  $|x|, |y| < 2^{25}$ . You may assume that the input points in each test case are unique, that is, no two graypes are at the same position initially. If there is a graype that has several closest graypes, then it runs towards the one among those that is located at a lexicographically smallest position (that is, a position with smallest  $x$ -coordinate and among those that have the same  $x$ -coordinate, the one with a smallest  $y$ -coordinate). The input is terminated by a line containing a single value 0.

**Output** For each input, the output is a single integer on a separate line. The output is the time in hundredth of a second needed for the first graype to reach another graype (i.e., until two graypes occupy the same position), rounded up to the next integer.

### Sample Input

```
3
0 0
-100 -100
3536 3536
2
0 0
3535 3535
0
```

### Sample Output

```
7072
249963
```