

## 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 1m/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
```