C - King's Summit

Editorial (/contests/abc419/tasks/abc419_c/editorial)

Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 300 points

Problem Statement

There is a grid with 10^9 rows and 10^9 columns. Let (i, j) denote the square at the i-th row from the top and j-th column from the left.

There are N people on the grid. Initially, the i-th person is at square (R_i, C_i).

The time starts at 0. Each person can do the following move at times $1, 2, 3, 4, \ldots$.

- Stay at the current position, or move to an 8-adjacent square. It is forbidden to leave the grid. Formally, let square (i, j) be the current square, and move to one of the squares $(i-1, j-1), (i-1, j), (i-1, j+1), (i, j-1), (i, j), (i, j+1), (i+1, j-1), (i+1, j), (i+1, j+1)$ that exists. Assume that the move takes no time.

Find the minimum possible time when the N people are at the same square.

Constraints

- $1 \leq N \leq 2 \times 10^5$
- $1 \leq R_i, C_i \leq 10^9$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \\
&R_1 \quad C_1 \\
&R_2 \quad C_2 \\
&\vdots \\
&R_N \quad C_N
\end{aligned}
$$

Output

Output the answer.

Sample Input 1 Copy

Copy

```
3
2 3
5 1
8 1
```

Sample Output 1 Copy

Copy

```
3
```

All people will be at square $(5, 4)$ at time 3 if each person moves as follows.

- At time 1, the 1st person moves to square $(3, 4)$, the 2nd person moves to square $(6, 2)$, and the 3rd person moves to square $(7, 2)$.
- At time 2, the 1st person moves to square $(4, 4)$, the 2nd person moves to square $(5, 3)$, and the 3rd person moves to square $(6, 3)$.
- At time 3, the 1st person moves to square $(5, 4)$, the 2nd person moves to square $(5, 4)$, and the 3rd person moves to square $(5, 4)$.

Sample Input 2 Copy

Copy

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```
5
6 7
6 7
6 7
6 7
6 7
```

Sample Output 2 Copy

```
0
```

All people start at the same square.

Sample Input 3 Copy

```
6
91 999999986
53 999999997
32 999999932
14 999999909
49 999999985
28 999999926
```

Sample Output 3 Copy

```
44
```

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