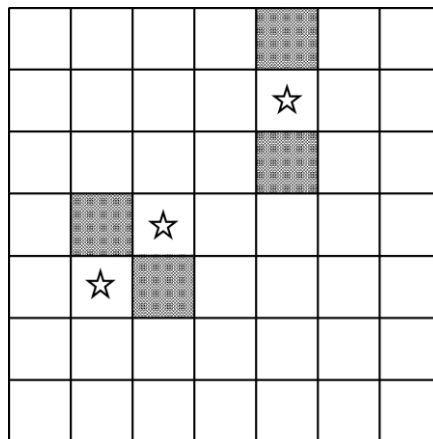


Infestation

You have a grid cell of dimension $10^9 \times 10^9$. Each cell in the grid is identified by the coordinate pair (row number, column number). Initially some of the celled are infested. The infestation spreads by the following rule: A cell, which is not currently infested, becomes infested if and only if at least 2 of the 4 adjacent cells are currently infested. This rule is applied every second. For example, if the shaded cells in the following are currently infested, the cells marked with stars will be infested in the next second. Incidentally, there will be no more infestation after that.



Write a program, given the coordinates of the cells initially infested, that computes for how many seconds the infestation spreads before it stops. In the above example, the answer will be 1.

[Input]

In the first line of the input file is given the number of test cases T . ($T \leq 100$) The first line of a test case contains N , which is the number of cells initially infested. In each of the next N lines, the coordinates, row number and column number, that is, for each cell is given.

The input is given in 3 sets as follows:

- Set 1: The coordinate values are at most 500 and N is at most 100.
- Set 2: The coordinate values are at most 5,000 and N is at most 1,000.
- Set 3: The coordinate values are at most 10^9 and N is at most 1,000.

[Output]

For each test case, print the number of seconds the infestation spreads.

[Input/Output Example]

Input

1

4

1 5

3 5

4 2

5 3

Output

1