

Bacteria

Problem

A number of bacteria lie on an infinite grid of cells, each bacterium in its own cell.

Each second, the following transformations occur (all simultaneously):

1. If a bacterium has no neighbor to its north and no neighbor to its west, then it will die.
2. If a cell has no bacterium in it, but there are bacteria in the neighboring cells to the north and to the west, then a new bacterium will be born in that cell.

Upon examining the grid, you note that there are a positive, finite number of bacteria in one or more rectangular regions of cells.

Determine how many seconds will pass before all the bacteria die.

Here is an example of a grid that starts with 6 cells containing bacteria, and takes 6 seconds for all the bacteria to die. '1's represent cells with bacteria, and '0's represent cells without bacteria.

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000010
011100
010000
010000
000000
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000000
001110
011000
010000
000000
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000000
000110
001100
011000
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000010
000110
001100
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000010
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000010
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Input

The input consists of:

- One line containing **C**, the number of test cases.

Then for each test case:

- One line containing **R**, the number of rectangles of cells that initially contain bacteria.
- **R** lines containing four space-separated integers **X₁ Y₁ X₂ Y₂**. This indicates that all the cells with X coordinate between **X₁** and **X₂**, inclusive, and Y coordinate between **Y₁** and **Y₂**, inclusive, contain bacteria.

The rectangles may overlap.

North is in the direction of decreasing Y coordinate.

West is in the direction of decreasing X coordinate.

Output

For each test case, output one line containing "Case #N: T", where N is the case number (starting from 1), and T is the number of seconds until the bacteria all die.

Limits

$1 \leq C \leq 100$.

Large dataset

$1 \leq R \leq 1000$

$1 \leq X_1 \leq X_2 \leq 1000000$

$1 \leq Y_1 \leq Y_2 \leq 1000000$

The number of cells initially containing bacteria will be at most 1000000.

Sample

Input Output

1
3

5 1 5 1 Case #1: 6

2 2 4 2

2 3 2 4