Connecting Islands

The newly formed city X is depicted using an **M x M** grid of cells. The **bottom-left** corner cell of the grid is **(0,0)** while the **top-right** corner cell of the grid is **(M-1, M-1)**. Each cell is either **land** or **ocean**, but **not both**. If you are in a land cell you can walk to any one of 4 of neighboring (left, right, up or down) land cells from there. You can not walk into an ocean cell. Also, you can't walk outside of the grid.

There are **N** islands in the city right now. And the islands are **rectangular shaped**. Therefore the island can be defined by its bottom-left cell position and upper-right cell position. In a given island, if bottom-left corner cell is **(x1,y1)** and upper-right corner cell is **(x2,y2)** then the total number of cells in that island is **(x2-x1+1) * (y2-y1+1)**. Also, any given land cell in the grid is a part of exactly one island.

The cost of converting an ocean cell to a land cell is 1. Write a program to find the minimum cost required to connect all lands so that you can walk from any land cell to any other land cell in the city.

Input Format

The first line of the input has **2** integers **M** and **N**, the size of the grid & the number of islands in the city respectively. Each of the next **N** lines contains **4** integers $x1_i$, $y1_i$, $x2_i$, $y2_i$ separated by spaces, representing the i^{th} island in the city.

Constraints

- $0 \leq x1_i \leq x2_i < M$
- $0 \leq y1_i \leq y2_i < M$

Subtask 1: 20 points

- $1 \leq M, N \leq 20$

Subtask 2: 30 points

- $21 \leq M, N \leq 100$

Subtask 3: 40 points

- $101 \leq M \leq 10^5$
- $101 \leq N \leq 10^3$

Subtask 4: 10 points

- $101 \leq M \leq 10^5$
- $101 \leq N \leq 10^4$

Limits

- **Time Limit**: 3s
- **Memory Limit**: 256MB

Output Format

Output just **one** integer representing your answer, the **minimum cost** required to connect all land cells.

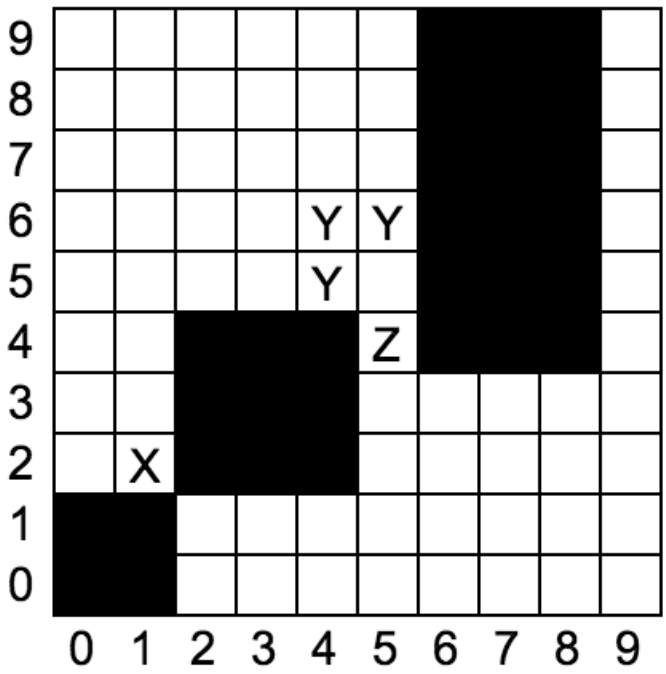
Sample Input 0

```
10 3
0 0 1 1
2 2 4 4
6 4 8 9
```

Sample Output 0

```
2
```

Explanation 0



Converting cell **X** and **Z** as land cells result in connecting all land cells.

Alternatively, we could have converted cells marked in **Y** instead of **Z**. But that will result in a total cost of 4 which is not optimum.