6916   Punching Robot

In this problem, you are given a grid map of $N \times M$ (N rows and M columns) where the rows are numbered 1...N from top to bottom, and the columns are numbered 1...M from left to right. Your task is to count in how many ways you can reach cell (N, M) from cell $(1, 1)$ given that you are only allowed to move right or downward at any time, i.e. if your current location is at cell (r, c), then you can only move to cell $(r + 1, c)$ or $(r, c + 1)$. However, we quickly realized that this kind of problem could be too easy for you, thus, not challenging. Therefore, we decided to put K punching robots in the map. Each punching robot is able to punch any object which lies in any of 3×3 cells centered at the robot (Figure 1). To simplify the problem, you may assume that the punching areas of any robot do not overlap.
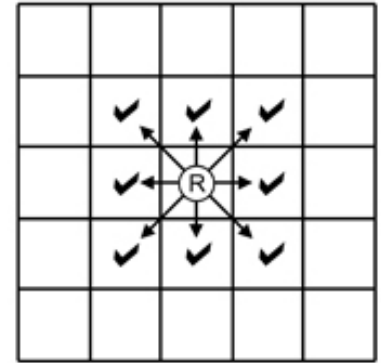

Figure 1.

Your (new) task is: count in how many ways you can reach cell (N, M) from cell $(1, 1)$ without being punched by any robot, given that you are only allowed to move right or downward at any time. As the output can be very large, you need to modulo the output by 997. For example, consider the following map of 4 x 10 with two punching robots at $(3, 3)$ and $(2, 8)$.
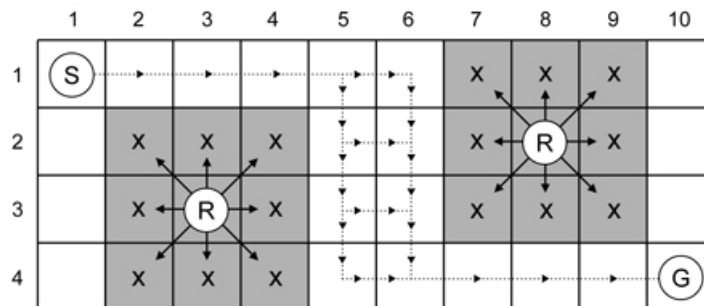

Figure 2.

In this example, there are 4 ways to reach (4, 10) from (1, 1) without being punched by any of the robots. All those 4 paths only differ when they go from (1, 5) to (4, 6):

- ..., (1, 5), (1, 6), (2, 6), (3, 6), (4, 6), ...

- ..., (1, 5), (2, 5), (2, 6), (3, 6), (4, 6), ...

- ..., (1, 5), (2, 5), (3, 5), (3, 6), (4, 6), ...

- ..., (1, 5), (2, 5), (3, 5), (4, 5), (4, 6), ···

Meanwhile, there is only one unique path from (1, 1) to (1, 5) and from (4, 6) to (4, 10).

Input

The first line of input contains an integer T ($T \le 100$) denoting the number of cases. Each case begins with three integers: N, M, and K ($2 \le N, M \le 1,000,000$; $0 \le K \le 10$) denoting the size of the map and the number of punching robots respectively. The following K lines, each contains two integers: R_i and C_i ($1 < R_i < N$; $1 < C_i < M$) denoting the position of i-th robot (row and column respectively)

in the map. You are guaranteed that, for any two robots, the row difference or the column difference will be at least 3, i.e. no two robots' punching areas are overlapping. You are also guaranteed that cell $(1, 1)$ and cell (N, M) are not in punching areas of any robots.
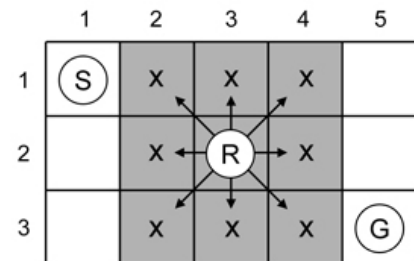
Output

For each case, output 'Case #X: Y', where X is the case number starts from 1 and Y is the answer for that case *modulo* by 997.

Explanation for 2nd sample case:

The following figure represents the map for the 2nd sample case.

As you can see, there is no way you can reach $(3, 5)$ from $(1, 1)$ without being punched by the robot.

Sample Input

```
4
4 10 2
3 3
2 8
3 5 1
2 3
5 5 0
10 9 3
9 3
6 8
3 4
```

Sample Output

```
Case #1: 4
Case #2: 0
Case #3: 70
Case #4: 648
```