IOITC 2020 Practice Test 3

Table Coloring

Sam and his sister Sara have a table of $n \times m$ square cells. They want to color all cells in red or blue. Due to personal beliefs, they want every 2×2 square in the table to have an odd number of red cells (i.e. 1 or 3).

Unfortunately, last night, someone had colored some cells of the table red and others with blue! Sam and Sara are wondering whether they can color the rest of the table according to their rules or not. If it is possible, they want to know in how many ways they can color the table such that no 2×2 square contains an even number of red cells.

Input

- The first line of the input contains three integers, n, m and k, respectively the number of rows and columns of the table, and the number of initially-colored cells.
- i^{th} of the next k lines contains three integers, x_i, y_i and c_i, where x_i and y_i denote the row number and column number of the i^{th} initially-colored cell. c_i is equal to 1 if that cell is colored in red and 0 if it is colored in blue. It is guaranteed that these k cells have distinct positions.

Output

Print a single line containing the number of ways of coloring the remaining cells of the table modulo 10^9.

Test Data

In all inputs, $1 \leq x_i \leq n$, $1 \leq y_i \leq m$, $0 \leq c_i \leq 1, k \geq 0, n \geq 1, m \geq 1$.

Subtask 1 (20 Points): $n, m, k \leq 5$

Subtask 2 (30 Points):

- $n, m \leq 5000$
- $k \leq 25$

Subtask 3 (50 Points): $n, m, k \leq 10^5$

Sample Input

```
3 4 3
2 2 1
1 2 0
2 3 1
```

Sample Output

```
8
```

Limits

Time: 1 second

Memory: 512 MB