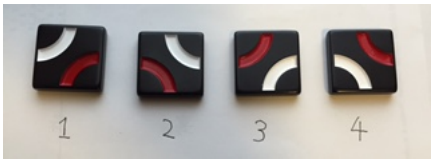
Problem G. TRAX

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	512 mebibytes

Snuke plays with the following tile (this tile is used in a game called TRAX):

Snuke wants to fill an $H \times W$ grid with these tiles. In each cell of the grid, he places a tile in one of the four orientations:



These orientations are numbered 1 through 4 as in the picture above.

The placement of tiles must satisfy the following constraints:

- A red arc must not touch a white arc.
- The grid must not contain cycles (see the examples below).
- For each $i (1 \leq i \leq N)$, in the cell that is R_i-th from the top and C_i-th from the left, the orientation of the tile must be D_i.

For example, the following picture shows two invalid placements of tiles. The placement on the left contains a white cycle, and the placement on the right contains a red cycle and a white large cycle.

Count the number of valid placements, modulo $10^9 + 7$.

Input

H W
N
R_1 C_1 D_1
$\vdots$
R_N C_N D_N

- $1 \leq H, W \leq 10^5$
- $0 \leq N \leq 10^5$

- $1 \le R_i \le H$
- $1 \le C_i \le W$
- $1 \le D_i \le 4$
- (R_i, C_i) are pairwise distinct.

Output

Print the number of valid placements, modulo $10^9 + 7$.

Examples

standard input	standard output
2 2 1 1 1 4	4
2 10 2 1 1 1 1 2 1	0
2015 1114 0	711460824
2 2 2 1 1 1 2 2 3	0
5 6 3 1 2 2 4 1 1 5 6 4	12
5 6 2 3 3 4 3 4 2	39

Note

For sample 1, these are the four valid placements: