Binary Chess (binarychess)

There is a chess board of R rows and C columns. There are N cells that are occupied by chess pieces, and all other cells are empty. You don't know what exact pieces occupy them, but you know that each piece is either a rook or a bishop. You also know that no rook attacks a bishop, and no bishop attacks a rook.

How many valid arrangements of pieces exist? Since this number might be too big, output it modulo $10^9 + 7$. Two arrangements are considered different if there is at least one cell which is occupied by a different piece.

☞ Among the attachments of this task you may find a template file binarychess.* with a sample incomplete implementation.

Input

The input file consists of:

- a line containing integers R, C, N.
- N lines, the i-th of which consisting of integers $\texttt{rr}_i$, $\texttt{cc}_i$.

Output

The output file must contain a single line consisting of integer K.

Constraints

- $1 \le R, C \le 10^9$
- $1 \le N \le \min(R \cdot C,\ 200\,000)$
- $1 \le \texttt{rr}_i \le R$, $1 \le \texttt{cc}_i \le C$ for each $i = 0 \dots N-1$.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

– **Subtask 1** (0 points) Examples.

– **Subtask 2** (11 points) $R, C \le 1000$ and $N \le \min(R \cdot C,\ 1000)$

– **Subtask 3** (19 points) $R, C \le 1000$

– **Subtask 4** (19 points) $N \le \min(R \cdot C,\ 1000)$

– **Subtask 5** (51 points) No additional limitations.

Examples

input	output
4 2 2 1 1 3 2	4
3 3 3 2 1 3 3 1 1	2