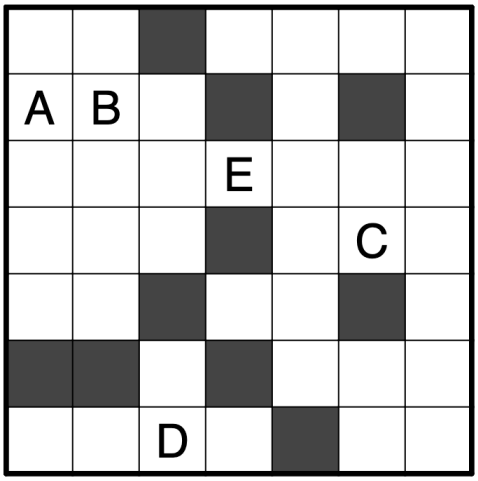
Rectangle Flip 3

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

Little Cyan Fish has a rectangle with n rows and m columns, where the rows and columns are both indexed starting from 0. The cell at the i-th row and j-th column can be represented as (i, j) $(0 \le i \le n-1, 0 \le j \le m-1)$. Initially, all cells are present (not deleted).

Little Cyan Fish calls two cells (x_a, y_a) and (x_b, y_b) adjacent if and only if $|x_a - x_b| + |y_a - y_b| = 1$. In other words, these two cells share a common boundary (also known as 4-adjacent). And for two cells $p = (x_a, y_a)$ and $q = (x_b, y_b)$, if they can be connected together through a sequence of adjacent undeleted cells, then cell p and q are said to be connected (4-connected).



For example, consider the above situation (black cells represent deleted cells, and white cells represent undeleted cells), cell A and cell B are adjacent. Cell A is connected to cell B and cell C, but cell A and cell D are not connected.

Now, Little Cyan Fish is going to perform some operations in his dream. In each operation, Little Cyan Fish will choose a cell (x, y) and delete the cell (x, y).

Little Cyan Fish is very curious about how many remaining undeleted cells in the current rectangle are cut vertices after each deletion. Specifically:

- For a certain cell $r = (x_r, y_r)$, if there exist two cells $p = (x_p, y_p)$ and $q = (x_q, y_q)$, such that p and q are connected in the grid, but are not connected after deleting cell r, then r is called a cut vertex.

For example, in the figure above, cell E is a cut vertex. Because for cell A and cell C, they are connected before cell E is deleted, but are no longer connected after cell E is deleted.

However, since Little Cyan Fish's dream is very magical, you cannot predict his subsequent operations. Therefore, you need to answer all these operations online. Specifically, the given (x, y) in the i-th $(2 \le i \le q)$ operation will depend on the returned result of the $(i-1)$-th operation. Please help Little Cyan Fish answer all queries under this restriction.

Input

The first line of the input contains three integers n, m, and q $(2 \le n, m \le 500,\ 1 \le q \le n \cdot m)$.

The next q lines each contain two integers x'_i, y'_i ($0 \le x'_i < n, 0 \le y'_i < m$), indicating the encrypted coordinates of the deleted cell (x_i, y_i). If the answer to the previous query was preans, then the true $x_i = (x'_i + \text{preans}) \bmod n$, $y_i = (y'_i + \text{preans}) \bmod m$. Initially, we consider preans $= 0$.

It is guaranteed that the decrypted (x_i, y_i) are pairwise distinct. That is, the same cell will not be deleted multiple times.

Output

For each operation, output a single line containing one integer, indicating the number of cut vertices after this deletion operation.

Example

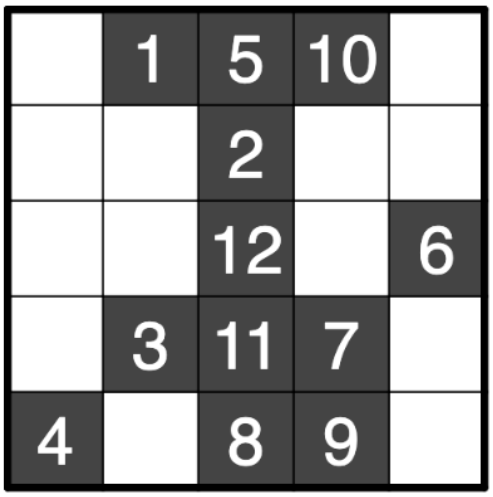
standard input	standard output
5 5 12 0 1 0 1 1 4 2 3 4 1 2 4 1 1 4 2 2 1 4 2 1 0 0 0	1 2 2 6 5 7 10 7 6 7 7 4

Note

The decrypted data:

5 5 12
0 1
1 2
3 1
4 0
0 2
2 4
3 3
4 2
4 3
0 3
3 2
2 2

Below is the order in which each cell is painted black.


1 5 10
2
12 6
3 11 7
4 8 9