Bipartite Graph

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

You are given a bipartite graph. The left half contains n vertices indexed from 0 to $n-1$, and the right half contains m vertices indexed from 0 to $m-1$. Initially there are k edges. On i-th step (counting from 0-th step) an edge between the vertex ($i \bmod n$) in the left half and the vertex ($i \bmod m$) is added.

How many steps will pass before the graph becomes connected?

Input

The first line contains three numbers n, m and k ($1 \le n, m \le 10^9$, $0 \le k \le 10^5$).

i-th of the next k lines contains two integers u_i и v_i — indices of vertices of left and right half connected by i-th edge ($0 \le u_i < n$, $0 \le v_i < m$).

Multiple edges are allowed.

Output

Print the answer to the problem. If the graph never becomes connected, print -1 instead.

Examples

standard input	standard output
3 5 2 1 3 2 1	5
3 3 1 0 2	-1