Problem K. Reachability in a Matrix

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	512 mebibytes

You are given a matrix A of size $n \times m$ consisting of **distinct** integers from 1 to $n \cdot m$. The rows of the matrix are numbered from 1 to n, and the columns are numbered from 1 to m. Also, a **positive** integer k is given.

Let us construct a graph consisting of $n \cdot m$ vertices, where the vertices will be the cells of the matrix, labeled as (a, b) ($1 \le a \le n$, $1 \le b \le m$). We will draw a **directed** edge from cell (a, b) to cell (c, d) if both of the following conditions are met:

- The cells are in the same row or column of the matrix. More formally, $a = c$ or $b = d$.
- $A_{a,b} \ge A_{c,d} + k$.

You are given q queries of the form (a, b, c, d). You need to determine whether there exists a path in this graph along the directed edges, starting at vertex (a, b) and ending at vertex (c, d).

Input

The first line of the input file contains three integers, n, m, and k ($1 \le n, m \le 250$, $1 \le k \le n \cdot m$).

Each of the next n lines contains m integers separated by spaces: the values $A_{i,j}$ ($1 \le A_{i,j} \le n \cdot m$). It is guaranteed that all numbers in the matrix are distinct.

The next line contains a single integer q: the number of queries ($1 \le q \le 250\,000$).

Each of the next q lines contains four integers, a_i, b_i, c_i, and d_i: the vertices in the i-th query ($1 \le a_i, c_i \le n$, $1 \le b_i, d_i \le m$, $(a_i, b_i) \ne (c_i, d_i)$).

Output

For each of the q queries, output a line with the word "`Ia`" if a path exists. Otherwise, output a line with the word "`Joq`".

Example

standard input	*standard output*
3 3 2 2 4 6 1 8 3 5 9 7 6 3 2 1 3 3 1 1 1 3 2 1 1 1 3 2 1 3 2 2 3 2 2 3 3	Joq Ia Ia Ia Ia Joq

Note

In the third query, there exist paths $(3, 2) \to (3, 1) \to (1, 1)$ and $(3, 2) \to (1, 2) \to (1, 1)$.

In the fourth query, there exists a path $(1, 3) \to (2, 3) \to (2, 1)$.