

Problem D. Contests

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 512 megabytes

There are n contestants and they take part in m contests. You are given the ranklist of each contest. The ranklist of the k -th contest is a sequence a_k , indicating that the $a_{k,i}$ -th contestant's rank is i .

SolarPea and PolarSea are two of the n contestants. SolarPea wants to prove that he is stronger than PolarSea.

Define x is l -stronger than y , if and only if there exists a sequence b of length $l + 1$, such that $b_1 = x$, $b_{l+1} = y$, and for all $1 \leq i \leq l$, b_i has a smaller rank than b_{i+1} in at least one contest.

There are q queries. In the i -th query, SolarPea is contestant x and PolarSea is contestant y . Please find the minimum positive number l such that SolarPea is l -stronger than PolarSea.

Input

The first line contains two integers n ($2 \leq n \leq 10^5$) and m ($1 \leq m \leq 5$).

The i -th of the next m lines contains n integers $a_{i,1}, a_{i,2}, \dots, a_{i,n}$. It is guaranteed that a_i is a permutation of $1, 2, \dots, n$.

The next line contains an integer q ($1 \leq q \leq 10^5$).

Each of the next q lines contains two integers x and y ($1 \leq x, y \leq n, x \neq y$), representing a query.

Output

For each query, output a number l representing the answer. If there is no legal l , output -1 .

Example

standard input	standard output
6 2	1
1 3 2 5 4 6	2
2 1 4 3 6 5	5
4	3
1 4	
5 3	
6 1	
5 2	