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 $1 \le i \le k$, 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 ($2 \le n \le 10^5$) and m ($1 \le m \le 5$).

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

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

Each of the next q lines contains two integers x and y ($1 \le x, y \le n, x \ne y$), 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 3 2 5 4 6 2 1 4 3 6 5 4 1 4 5 3 6 1 5 2	1 2 5 3