Problem K
Toxic Culinarity

The *International Culinary Preparatory College* welcomes a fresh batch of n students, labeled 1 to n. Each one has ambitions of becoming the best chef in the Philippines. At the start of the year, no one is friends yet, but as the year progresses, some of these students will become *"friends"* with one another.

There will be q events throughout the year. Each event specifies two different students u and v, and it means:

- If u and v are not yet friends, then they become friends.
- If u and v are already friends, then they **stop** being friends.

On the competitive cooking website Cookforces, each user is assigned an integer rating from 1 to c. Multiple users can have the same rating. Students in the ICPC are encouraged to aim for a high rating on Cookforces.

A student acts *toxic* if they are not friends with anyone with a strictly higher Cookforces rating than them. The *Ramsay number* of the school is equal to the number of toxic students it has at that particular moment.

One day, the creator of Cookforces got fed up with everyone's obsession over rating, and decided to go with the nuclear option. He announced that he has programmed the website to—without warning, at some unknown time in the future—*completely randomize all the ratings.* Each user's rating will just become an integer uniformly randomly selected from 1 to c.

This, of course, threw the school into complete chaos. After each of the q events described above, please answer the following question:

- If the ratings were randomized *immediately after this event*, what would be the *expected value* (modulo 1224736769) of the Ramsay number of the school?

Suppose we repeatedly perform the random experiment of "randomize all the users' ratings" and then record the Ramsay numbers we get. The expected value is equal to what our running average will converge to (with high probability).

*Formally, let $x_1, x_2, x_3, \ldots$ be an infinite sequence where x_t is the **average** of the recorded Ramsay numbers from the first t random experiments. We can prove that there exist positive integers p and q such that $\lim_{t\to\infty} x_t = p/q$ almost surely.*

Your task is to report, after each event, the value of $pq^{-1} \pmod{1224736769}$; more formally, output the value r such that $p \equiv qr \pmod{1224736769}$. We can show that such an r always exists and is unique (modulo 1224736769), given the constraints.

Input Format

The first line of input contains the three space-separated integers n and c and q.

Then, q lines follow, describing the events in the order they occur. Each line contains some two space-separated positive integers, the values of u and v for this event.

Output Format

Output q lines, each containing a single non-negative integer—the *expected value* (modulo 1224736769) of the Ramsay number immediately after each event.

Constraints

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$2 \le n \le 2 \times 10^5$ $2 \le c \le 10^9$ $1 \le q \le 3 \times 10^5$ $1 \le u, v \le n$ and $u \ne v$ in each event.

Sample I/O

Input	Output
3 2 4 1 2 2 3 1 3 1 2	612368387 1071644675 153092098 1071644675

Explanation

The expected values of the Ramsay number after each event are, respectively:

- 5/2,
- 17/8,
- 15/8,
- 17/8.

We say that, for example,

$$5/2 \equiv 612368387 \pmod{1224736769}$$

because

$$612368387 \cdot 2 \equiv 5 \pmod{1224736769}$$

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