Byteland Itinerary

A Byteland Vacation

You're planning a vacation to Byteland. It has m cities, and you can travel between cities either by *plane* or by *car*. There are exactly k highways in Byteland, and highway i connects cities a_i and b_i. If you want to travel from some city u to some city v and there is no highway between them, you can travel the distance from u to v by plane.

One curious feature of Byteland is that *the number of highways connecting some city to others is equal for each city in Byteland*. More formally, let deg_u be the number of cities such that there is a highway directly connecting city u to some city, v. $deg_u = deg_v$ for all $1 \leq u, v \leq m$.

You want to finalize the itinerary for your Byteland vacation. You decide to visit a sequence of n cities, A, such that $1 \leq a_i \leq m$. During your trip, you'll visit each city in the sequence $A = \{a_1, a_2, \ldots, a_n\}$; first traveling to city a_1, then traveling from a_1 to a_2, then traveling from a_2 to a_3, $\ldots$, finally traveling from a_{n-1} to a_n. Be aware that you *may end up visiting certain cities more than once*.

Exciting Roads

There are two ways to travel from a_i to a_{i+1}: by plane or by car. However, your preference is to travel by car because you dislike going through airport security and waiting in endless lines.

We call a continuous subsequence, (l, r), of A *exciting* if you can travel all the cities from a_l to a_r by car. More formally, (l, r) is exciting if for each $l \leq i \leq r-1$ there is a highway between a_i and a_{i+1} (note that a_i must not be equal to a_{i+1}).

We call $r - l + 1$ the *length* of continuous subsequence (l, r). You want to maximize the length of maximum exciting subsequence of A.

Task

You decide to take a random itinerary, A (recall that $|A| = n$, and each a_i is a random city from 1 to m) and follow it. You want to know the expected maximum length of a continuous exciting subsequence in your itinerary.

Input Format

The first line contains three space-seperated non-negative integers describing the respective values of n (the number of cities in your itinerary), m (the number of cities in Byteland), and k (the number of highways in Byteland). Each line i of the k subsequent lines contain two space-separated positive integers describing the respective cities, a_i and b_i, connected by highway i in Byteland.

Constraints

- $1 \leq n, m \leq 10^5$
- $0 \leq k \leq 10^6$
- $1 \leq a_i, b_i \leq m$, $a_i \neq b_i$
- There are no loops and no multiple edges in Byteland road graph.
- All roads are undirected.
- Test cases with $n, m \leq 10$ are 10% of the total score.

- Test cases with $n, m \leq 100$ are 25% of the total score
- Test cases with $n, m \leq 1000$ are 50% of the total score

Output Format

Let the answer be an irreducible fraction, $\frac{p}{q}$. Print the result of $(p \cdot q^{-1})\ mod\ (10^9 + 7)$.

Sample Input 0

```
3 2 0
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Sample Output 0

```
1
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Explanation 0
There are no roads, meaning that all the exciting subsequences have length 1. The expected length is also 1.

Sample Input 1

```
3 3 3
1 2
2 3
3 1
```

Sample Output 1

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333333338
```

Explanation 1
There are exactly 27 different plans and there are highways connecting all the cities. There are 3 sequences with maximum length of exciting subsequence 1, 12 sequences with maximum length of exciting subseqence 2 and 12 sequences with maximum length of exciting subsequence 3.

The expected value of maximum length: $E = (1 \cdot 3 + 2 \cdot 12 + 3 \cdot 12)/3^3 = 63/27 = 7/3$.

That means, we need to print $7 \cdot 3^{(-1)}$ modulo $(10^9 + 7) = 333333338$. $3^{(-1)}$ means Modulo inverse here.