International Olympiad in Informatics 2020
Practice Session
April 4, 2020
Singapore, Singapore
Session 8 Tasks

`wheelofmisfortune`
English (US)

Wheel of Misfortune

You have been hired to construct the wheel for the failing game show *Wheel of Misfortune*.

There need to be n segments on the wheel. These segments will have $\$1, \$2, \$3, \ldots, \$n$ in some order. (Before you ask: yes, the budget of this show has decreased greatly from its golden days.)

Two consecutive segments on the wheel cannot have a value difference greater than $\$k$. (Apparently the investors don't know how to build suspense, and don't know that putting two vastly different valued segments next to each other is way more exciting.)

Finally, there are m forbidden pairs. The ith of these pairs says that the segment with value $\$y_i$ cannot immediately follow the segment with value $\$x_i$ clockwise. (These investors are really superstitious.)

How many possible wheels can you construct? Note that wheels are considered equivalent up to rotation.

Since this number can be quite large, output only the remainder after dividing it by $10^9 + 7$.

Input format

The first line of input contains three integers n, m and k, the number of segments, the number of forbidden pairs and maximum allowed value difference between consecutive segents.

The next m lines describe the forbidden pairs. The ith of these lines contains two integers x_i and y_i, denoting that the segment with value $\$y_i$ cannot immediately follow the segment with value $\$x_i$ clockwise.

Output format

Output a single integer on a line by itself, the number of possible wheels.

Since this number can be quite large, output only the remainder after dividing it by $10^9 + 7$.

Subtasks

In all subtasks $1 \leq n$, $0 \leq m \leq \min\left(n(n-1), 10^6\right)$, $0 \leq k \leq 3$.

All forbidden pairs are distinct.

Subtask	Points	n	Additional Constraints
1	4	$n \leq 8$	
2	13	$n \leq 16$	
3	13	$n \leq 10^6$	$k \leq 2$
4	29	$n \leq 10^6$	$m = 0$
5	21	$n \leq 10^6$	If $x_i = a$ and $y_i = b$ for some i then $x_j = b$ and $y_j = a$ for some j.
6	20	$n \leq 10^6$	

Example

Consider the following input:

```
5 2 3
1 3
5 4
```

The correct output is:

```
6
```

There are six possible wheels. The values on these wheels are, in clockwise order, starting from $\$1$:

1. $\$1$, $\$2$, $\$4$, $\$5$ and $\$3$;

2. $\$1$, $\$2$, $\$5$, $\$3$ and $\$4$;

3. $\$1$, $\$4$, $\$2$, $\$5$ and $\$3$;

4. $\$1$, $\$4$, $\$3$, $\$5$ and $\$2$;

5. $\$1$, $\$4$, $\$5$, $\$2$ and $\$3$;

6. $\$1$, $\$4$, $\$5$, $\$3$ and $\$2$.