Rome

SEASON 8 – SECOND ROUND

In Ancient Rome, before it became and empire, in the time of the famous Gaius Julius Caesar, they encountered the following problem: they had too many roads and these roads were expensive to maintain. Caesar, after he was already democratically declared a dictator for life, decided that a reformation was needed. He wondered, however, in how many ways he can remove roads in such a way to achieve his desired result. Naturally the answer needs to be found modulo $10^9 + 7$.

The Roman Republic consists of N towns and M roads between them. Each road is one-way and there isn't more than one road in the same direction between the same two towns, there is also no road from some town to itself. Of course, there can be two roads between two towns – one in each direction. Caesar wants to leave as few roads as possible, $N - 1$ roads to be exact. However, he can't leave any $N - 1$ roads. After the removal of the unneeded roads, he wants it to be possible in each town to either dig a mine or build a furnace for the raw materials from the mines. **It must be possible to reach each town with a furnace from each town with a mine and there must be at least one town with a mine and at least one town with a furnace.** The Roman Republic is rich in natural resources, so each town has the potential both for a mine and for a furnace – that is not a problem, it is only important that the transport network allows for such a division of the towns into two types.

Caesar found this task very difficult and just before he was about to give up, he asked you for help. He also told you the following really important information. **There are no more than two central towns in the republic, but there is at least one** – Rome and, if there is a second one, Avopanac (Awopanacc in Old Latin). **A central town is a town that has an (indirect) path to/from each other town.** Meaning that town i is a central town, if and only if for each $j \neq i$ either it is possible to reach j from i just by walking in the correct directions of the roads, or it is possible to reach i from j in the same way, or both.

Help Caesar by writing a program which is to be given a list of the roads in the Republic and finds the number of ways to leave exactly $N - 1$ roads, so that the new transport network allows for this type of division of all town into two types. Take notice that we are not looking for the number of ways to divide the towns into the two types.

Input

From the first line of the file `rome.in` two numbers are inputted – N and M. From each the following M lines two numbers describing a road are inputted – the numbers of the towns it connects. The road is from the first town to the second one. The towns are numbered from 1 to N (the map is cyphered, so you don't know which towns Rome and Avopanac are).

Output

In the output file `rome.out` print a single integer – the number of ways for Caesar to leave exactly $N - 1$ roads in such a way that the transport network has the wanted property modulo $10^9 + 7$.

Constraints

$0 < N \leq 300$

Time limit: 1 sec

Memory limit: 256 MB

Sample tests

Input (rome.in)	Output (rome.out)	Input (rome.in)	Output (rome.out)
4 5 1 2 1 3 1 4 2 4 3 4	6	7 12 1 2 1 3 1 4 2 1 2 3 2 4 2 7 3 7 5 1 5 2 6 1 6 2	25

Explanation of the first sample test

These are the possible transport networks: