

Problem 3 Air Circulation [Standard]

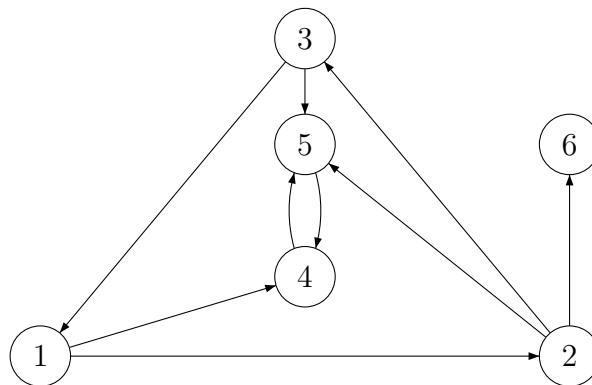
To maximize the inconvenience to its customers, Air Bharat is restructuring its services in terms of one way flights. Thus, to fly to a city and come back, you may have to take a circular route such as Delhi \rightarrow Kanpur \rightarrow Lucknow \rightarrow Delhi or Delhi \rightarrow Paris \rightarrow Frankfurt \rightarrow Delhi. However, on some busy sectors, there may be one way flights in both directions, such as Delhi \rightarrow Bombay \rightarrow Delhi.

This operational restructuring has reached such a point that for any city in the network, *if you want to start at that city, fly through a sequence of distinct cities and return to the starting city, there is at most one route you can take*. For some cities, there may not be even a single route that brings you back to the city that you started from.

The Managing Director has embarked on a morale boosting tour to meet employees at various cities (in First Class, of course!) and convince them that the airline will soon pull out of the financial mess that it currently finds itself in. His aim is to start at some city on the Air Bharat network and take a series of flights that take him through a sequence of cities without visiting any city twice—in particular, he must end his tour at a different city from where he started it.

As the Chief Operations Officer of Air Bharat, your job is to identify the number of flights he would take on the longest such tour within the Air Bharat network.

For instance, suppose Air Bharat flies to six cities numbered 1, 2, 3, 4, 5, 6 and the routes are organized as shown in the picture below. In this case, the longest tour the Managing Director would take would involve 4 flights: for instance, $2 \rightarrow 3 \rightarrow 1 \rightarrow 4 \rightarrow 5$.



Input format

The first line of input contains 2 integers, N and M , giving the number of cities in the network and the number of direct flights operated by Air Bharat. The cities are numbered from 1 to N . This is followed by M lines, each containing a pair of integers i and j that describes a direct flight from city i to city j , where $i \neq j$. There is at most one flight from one city to another in a given direction.

Output format

A single integer, the number of flights in the longest path through the Air Bharat network.

Test Data

- *Subtask 1 (10 marks)*: There is no sequence of flights from any city back to itself, $1 \leq N \leq 10^5$ and $1 \leq M \leq 10^6$.
- *Subtask 2 (40 marks)*: $1 \leq N \leq 300$ and $1 \leq M \leq 30000$.
- *Subtask 3 (20 marks)*: $1 \leq N \leq 3000$ and $1 \leq M \leq 10^6$.
- *Subtask 4 (30 marks)*: $1 \leq N \leq 10^5$ and $1 \leq M \leq 10^6$.

Sample input

```
6 9
1 2
2 3
3 1
4 5
5 4
1 4
3 5
2 5
2 6
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Sample output

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4
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Time and memory limits

The time limit for this task is 3 seconds. The memory limit is 128 MB.