

IOITC 2019

Team Selection Test 1

Make Acyclic

You are given a directed graph with N vertices and M edges. The nodes are numbered from 1 to N . You need to find the minimum number of edges to remove, so that the graph becomes acyclic. That is, the graph, after removing the edges, should not have any directed cycles.



Input

- The first line contains two integers, N and M , which denote the number of vertices and the number of edges respectively.
- The i^{th} of the next M lines contains two integers: u, v , which denotes that there is a directed edge from u to v .

Output

Output a single integer, which should be the minimum number of edges to remove to make it an acyclic graph.

Constraints

- $2 \leq N \leq 20$
- $1 \leq M \leq N * (N - 1)$
- No edge goes from a vertex to itself.
- There is at most one edge from u to v .

Subtasks

- Subtask 1: 9%: $2 \leq N \leq 5$
- Subtask 2: 12%: $2 \leq N \leq 10$
- Subtask 3: 79%: Original constraints.

Sample Input 1

```
5 7
1 2
2 3
3 1
3 5
5 4
4 1
1 4
```

Sample Output 1

```
2
```

Explanation 1

You can delete the edges $\{(4, 1), (1, 2)\}$, and the resulting graph will not have any directed cycle. You can also delete the edges $\{(4, 1), (2, 3)\}$, or $\{(4, 1), (3, 1)\}$. In all these cases, we are deleting two edges, and you can check that it is not possible to do so with fewer number of edges. Hence, the answer is 2.