Problem E
Prof. PVH and the country of 16

Time Limit: 2 seconds
Memory Limit: 512 Megabytes

Problem description

Prof. PVH is the president of the country of 16. The country has **n** cities connected by **m directed** roads.

A graph is said to be strongly connected if every vertex is reachable from every other vertex. The strongly connected components of a directed graph form a partition into subgraphs that are themselves strongly connected.

During this COVID-19 pandemic, our Prof is bored, so he has come up with a fabulous idea of reversing the direction one road. He needs to find out, for the i^{th} road $u_i \rightarrow v_i$, if he reverses the direction of this road to $v_i \rightarrow u_i$ and keeps the direction of the other *m-1* roads, will it change the number of strongly connected components.

Our Prof. has promised to treat you with delicious cups of bubble tea if you can help him solve this boring problem. Let's get it!

Input

The first line contains two integers $n, m (1 \leq n \leq 1000, 1 \leq m \leq 2 * 10^5)$ – the number of cities and the number of roads.

Next m lines, each contain two integers $u_i, v_i (1 \leq u_i, v_i \leq n, u_i \neq v_i)$ represents a directed edge from u_i to v_i

It's guaranteed that between any pair of cities there is at most one directed road connecting them.

Output

The output consists of m lines. In the i^{th} line, print Y if reversing the i^{th} road will change the number of strongly connected components, and print N otherwise.

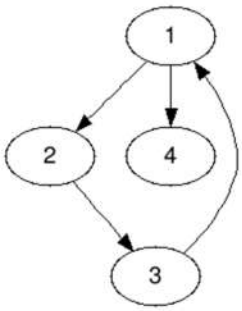
Example 1:

Input	Output
4 4 1 2 2 3 3 1 1 4	Y Y Y N

Example 2:

Input	Output
5 9 3 4 1 3 5 2 5 3 1 2 4 1 1 4 2 3 1 5	Y N N N N Y N Y Y

Explanation:



For the 1st example, the original number of SCC is 2. If we reverse one of the three edge $1 \rightarrow 2$, $2 \rightarrow 3$ and $3 \rightarrow 1$, the number of SCC will be 4, hence we print Y for those three edges. If we reverse edge $1 \rightarrow 4$, the number of SCC will still be 2, hence we print N for it.