Problem A. Zero AAMP Currents

Input file: `standard input`
Output file: `standard output`
Time limit: 2 seconds
Memory limit: 256 megabytes

Thomas Edison stumbled upon an alien electrical device that appears to break known laws of physics! The device consists of n batteries connected by m unidirectional wires, which we will represent as vertices and edges that form a graph. The i-th wire is directed from battery v_i to battery u_i, $v_i \neq u_i$. Let $(v_i \to u_i)$ denote such a wire.

To make this device work, Thomas must assign a current strength to each wire such that this assignment results in a successful configuration. For a configuration to be successful, two conditions must be met:

1) All current strength values are non-zero integers in the range $[-1000, 1000]$ AAMP (Alien Amperes).

2) For every cycle found in this device, the sum of AAMP values from all wires in it must be 0. A cycle is a sequence of edges (wires) $(a_1 \to a_2), (a_2 \to a_3), \ldots, (a_{k-1} \to a_k), (a_k \to a_1)$. If edges $(x \to y)$ and $(y \to x)$ both exist, they also form a cycle – the wires are unidirectional.

Help him with this task.

Input

The first line contains two integers n and m – the number of batteries and the number of wires in the device, respectively. Next, m lines contain two integers each v_i and u_i, which mean that the i-th wire goes from battery v_i to u_i.

$1 \leq n \leq 10^5$,

$1 \leq m \leq 2 \cdot 10^5$,

$1 \leq v_i, u_i \leq n$, $v_i \neq u_i$.

Output

Print m lines containing one number each: the i-th number should be the current strength of i-th wire (in AAMP). Each number should be non-zero and in the range of $[-1000, 1000]$. If multiple answers exist, you may print any one of them.

Example

standard input	standard output
4 7 1 2 2 3 3 1 1 4 2 4 1 4 3 2	-1 -1 2 -2 -1 -2 1

Note

Note that there can be multiple wires from battery x to y. Also note that wire $(x \to y)$ with strength 3 AAMP is not the same as $(y \to x)$ with strength -3. As mentioned before, wires are unidirectional and can have a negative current strength - that's one of the mysteries of this device ...