Challenge Matrix Multiplication

Input file:	`standard input`
Output file:	`standard output`
Time limit:	9 seconds
Memory limit:	256 megabytes

Take an $(\omega - 2)$*, cut away* 0.001 *of it every day, and at the end of ten thousand generations, there will still be some left.*

— Little Cyan Fish

It is well known that counting the reachability of the directed acyclic graph is hard to solve efficiently. But little tarjen claims that he has an algorithm to solve it in almost linear time. Formally, he solves the following problem and offers many test cases to show that his algorithm is correct:

- Given a directed acyclic graph (DAG) with n vertices and m edges, for each node u, find the number r_u, which is the number of vertices that can be reached starting from vertex u (including u itself).

However, clever as you are, you have found out that all the graphs little tarjen generates are special. To be more specific, let in_i be the in-degree of vertex i, and out_i be the out-degree of vertex i, then all the graphs satisfy $\sum_{i=1}^{n} |in_i - out_i| \leq 120$.

You want to show that under this constraint, solving the problem is very easy. Please write a program to solve the problem.

Input

The first line contains two integers n and m ($2 \leq n \leq 10^6$, $1 \leq m \leq 10^6$).

The following m lines, each line contains two integers u, v ($1 \leq u < v \leq n$), representing a directed edge in the graph.

It is guaranteed that $\sum_{i=1}^{n} |in_i - out_i| \leq 120$.

Output

One line contains n integers, representing $r_1, r_2, \ldots, r_n$.

Examples

standard input	standard output
4 6 1 3 2 3 2 4 1 2 1 3 1 3	4 3 1 1
5 7 1 4 1 5 1 2 2 4 3 4 2 5 1 4	4 3 2 1 1