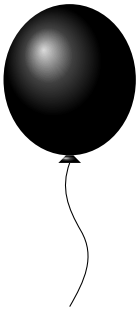
L System Administrator



Time limit: 3.0s
Memory limit: 512MB

Jannis is working as a system administrator. In the office where he works there are n computers number 1 to n. Computers are connected to the network using $n-1$ cables in such a way that any computer $x > 1$ is connected to computer $\lfloor \frac{x}{2} \rfloor$. All the cables can transfer data in both directions. One can notice that any two computers can directly or indirectly transfer data between each other.

Sometimes computer stops working, and the data it had to transfer is not passing through it. This can result into a situation when some other two computers cannot transfer data between each other. We call computer x *important* if such a situation happens after computer x stops working.

Jannis took m cables from the storage room before his daily routine started. He decided to connect some additional pairs of computers, he will connect the one by one. He wants to know how many important computers there are, after each connection takes place.

Input

The first line contains two integers n and m — the number of computers in the network, and the number of additional cables Jannis took from the storage room, respectively ($1 \le n \le 10^9$; $1 \le m \le 10^5$).

The i-th of the following m lines contains two integers x_i and y_i — the i-th pair of computers to connect ($1 \le x_i, y_i \le n$; $x_i \ne y_i$).

Output

Print $m+1$ lines, each containing a single integer. The $(i+1)$-th line should contain the number of important computers after connecting the i-th pair. The first line should contain the number of important computers initially.

Samples

Sample input 1	Sample output 1
7 2 6 7 5 6	3 3 1

Sample input 2	Sample output 2
8 4 1 4 1 5 1 6 1 7	4 4 3 3 2

Sample input 3	Sample output 3
2 2 2 1 1 2	0 0 0