Time limit: 1.00 s **Memory limit:** 512 MB

You are given a tree consisting of n nodes, and m paths in the tree.

Your task is to calculate for each node the number of paths containing that node.

Input

The first input line contains integers n and m: the number of nodes and paths. The nodes are numbered $1, 2, \ldots, n$.

Then there are $n-1$ lines describing the edges. Each line contains two integers a and b: there is an edge between nodes a and b.

Finally, there are m lines describing the paths. Each line contains two integers a and b: there is a path between nodes a and b.

Output

Print n integers: for each node $1, 2, \ldots, n$, the number of paths containing that node.

Constraints

- $1 \le n, m \le 2 \cdot 10^5$
- $1 \le a, b \le n$

Example

Input:
```
5 3
1 2
1 3
3 4
3 5
1 3
2 5
1 4
```

Output:
```
3 1 3 1 1
```