Fire on a Tree (fire)

You live in the country of Fuocus, and you recently watched a documentary about the devastating effects of fires. So now you are wondering what will happen if a fire starts in your country.

The capital city of Fuocus on fire.

The country is made up of N cities, numbered from 0 to $N-1$, connected by $N-1$ bidirectional roads. It is possible to travel from any city to any other city by following a sequence of roads, since trading between cities is an important part of the economy.

Unfortunately the roads are made of wood and they are therefore extremely flammable. In case of a fire in a city, the fire will spread to all the cities connected to it by a road. The fire will then spread to all the cities not already on fire connected to those cities by a road, and so on.

There is a firestation in each city, and as soon as the fire reaches a city, the firefighters are able to destroy at most one of the roads connected to that city, preventing the fire from spreading further using that road. Note that as soon as the fire reaches a city, that city cannot be saved anymore.

It is known that in case of a fire, the firefighters coordinate and act optimally to maximize the total number of cities saved in the country. For each city of the country, you would like to know how many cities will be destroyed if a fire starts in that city.

Input

The first line contains the integer N. The following $N-1$ lines contain two integers A_i and B_i, the cities connected by road i.

Output

You need to write a single line with N integers: the i-th of them is the number of cities that will be destroyed if the fire starts in city i.

Constraints

- $1 \leq N \leq 200\,000$.
- $0 \leq A_i < N$ for each $i = 0 \ldots N-2$.
- $0 \leq B_i < N$ for each $i = 0 \ldots N-2$.

Scoring

– **Subtask 1** (0 points) Examples.

– **Subtask 2** (35 points) $N \leq 100$.

– **Subtask 3** (25 points) $N \leq 2000$.

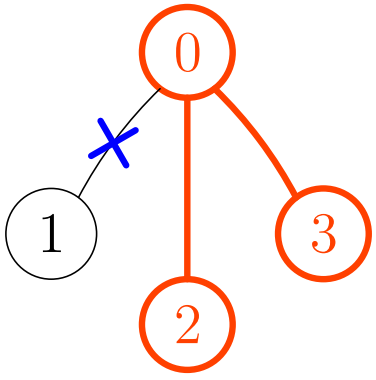
– **Subtask 4** (40 points) No additional limitations.

Examples

input	output
4 0 1 0 2 0 3	3 1 1 1
10 1 4 2 1 2 3 3 8 8 9 1 7 1 0 0 5 0 6	3 4 2 2 1 1 1 1 2 1

Explanation

In the **first sample case** if the fire starts in city 0, 3 cities will be destroyed. For example the firefighters in city 0 can destroy the road to city 1, saving it, but city 0, 2 and 3 will be destroyed by the fire. If the fire starts in city 1, 2 or 3 the firefighters can destroy the only connected road, stopping the fire from spreading.



In the **second sample case** if the fire starts in city 1 the cities 1, 2, 4 and 7 will be destroyed.