Easy Rooted Tree

Time Limit 1 sec/Memory Limit 256 MB

Given a rooted tree containing n vertices and $n - 1$ edge, you need to output the heights for all nodes and their parent. You can assume that the root is node 1 and its parent is -1.

Input Format

- The first line of the input contains one integer n.

- The following contain $n - 1$ lines. Each line consists of two numbers x_i, y_i, representing the edge connection between vertex x_i and vertex y_i.

Output format

- Output n lines.

- For i-th line, output two integers. The first integers represent the heights of vertex i, the second integers represent the parent for vertex i.

Constraints
- $1 \leq n \leq 10^5$

sample input #1	sample output #1
8	3 -1
1 2	2 1
2 3	1 2
3 4	0 3
1 5	1 1
5 6	0 5
5 7	0 5
1 8	0 1

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