

Splitting Trees (4 Points)

time limit per test: 2.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output
points: 100 · problem code: splittingtrees · author: jszqlw

Problem Statement

You are given a tree with n nodes labelled 1 to n and is rooted at node 1. For $1 \leq u \leq n$ we define $|u|$ to be the size (number of nodes) of the subtree rooted at u . You are to perform the following operation:

- Pick a node u such that one of its children v have the property $|u| \leq 2 \cdot |v|$
- Change the parent of either u or v to be any w where $1 \leq w \leq n$ and such that the tree remains a tree.

After performing any number of operations, determine the smallest length you can make the diameter.

Recall the definition of a **tree** is a connected graph with no cycles. Recall the **diameter** of the tree is defined to be the largest distance between any two nodes in the tree, and the distance between two nodes in a tree is the number of edges on the (only) path between those two nodes.

Input Format

Your first line will contain n , the number of nodes. Your next $n - 1$ lines will contain two space-separated integers each, u and v , meaning there is an edge between u and v .

Output Format

Output a single integer representing the smallest length you can make the diameter.

Constraints

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

Sample Cases

Input 1

```
7
1 2
1 3
2 4
2 5
4 6
4 7
```

Output 1

```
2
```

Input 2

```
5
1 2
1 3
3 4
3 5
```

Output 2

3

Input 3

10
1 2
1 3
1 4
1 5
1 6
1 7
7 8
7 9
7 10

Output 3

3