


## Long Chain (longchain)

You are given a tree with  $N$  vertices, numbered from 1 to  $N$  (a tree is an undirected connected graph in which there are no cycles). You are asked to partition it into edge-disjoint simple paths such that the length of the shortest one is maximized.

In this task, the length of a path is defined as the number of edges it has.

 Among the attachments of this task you may find a template file `longchain.*` with a sample incomplete implementation.

### Input

The first line contains an integer  $N$ . The next  $N - 1$  lines contain 2 integers  $u_i, v_i$ , denoting an edge of the tree.

### Output






You need to write a single line with an integer: the maximum length of the shortest path over all partitions of the tree into edge-disjoint simple paths.

### Constraints

- $2 \leq N \leq 100\,000$ .
- $1 \leq u_i, v_i \leq N$ .

### Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

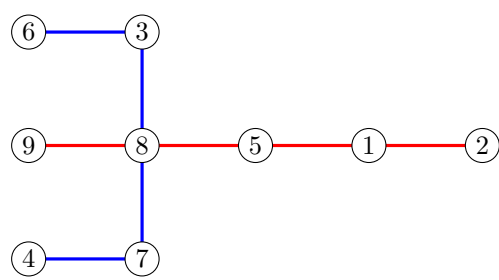
- **Subtask 1** (0 points)      Examples.  

- **Subtask 2** (10 points)       $N \leq 8$ .  

- **Subtask 3** (20 points)       $N \leq 100$ .  

- **Subtask 4** (20 points)       $N \leq 1000$ .  

- **Subtask 5** (50 points)      No additional limitations.  


Examples

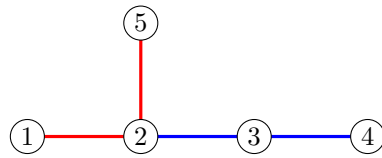
input	output
9 9 8 7 4 7 8 2 1 6 3 5 1 5 8 3 8	4
5 1 2 2 3 3 4 2 5	2
10 7 6 9 6 8 5 4 2 1 3 5 6 1 10 7 10 2 6	4
6 1 2 2 3 3 4 4 5 5 6	5

Explanation

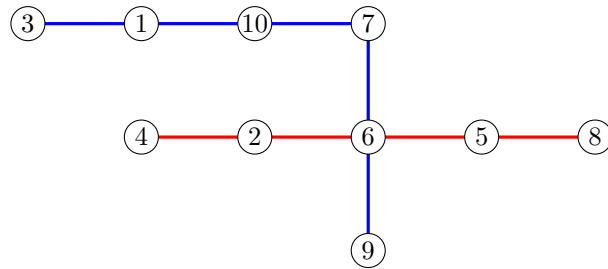
In the **first sample case**, an optimal split would be into 2 edge-disjoint paths, each of length 4: 2 – 1 – 5 – 8 – 9 and 4 – 7 – 8 – 3 – 6.



In the **second sample case**, an optimal split would be into 2 edge-disjoint paths, each of length 2: 1 – 2 – 5 and 2 – 3 – 4.



In the **third sample case**, an optimal split would be into 2 edge-disjoint paths, one of length 4:  $4 - 2 - 6 - 5 - 8$  and the other one of length 5:  $3 - 1 - 10 - 7 - 6 - 9$ .



In the **fourth sample case**, the whole tree consists of only one path of length 5.

