

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.



Figure 1: A tree with a bunch of vertices.

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.

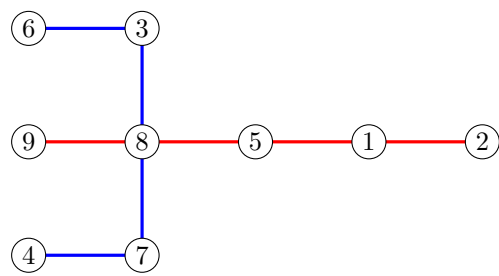
- **Subtask 1** (0 points) Examples.

- **Subtask 2** (20 points) $N \leq 8$.

- **Subtask 3** (25 points) $N \leq 100$.

- **Subtask 4** (30 points) $N \leq 1000$.

- **Subtask 5** (25 points) No additional limitations.


Examples

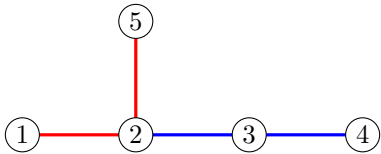
input	output
9 9 8 7 4 7 8 2 1 6 3 5 1 5 8 3 8	4
5 1 2 2 3 3 4 2 5	2
10 7 6 9 6 8 5 4 2 1 3 5 6 1 10 7 10 2 6	4
6 1 2 2 3 3 4 4 5 5 6	5

Explanation

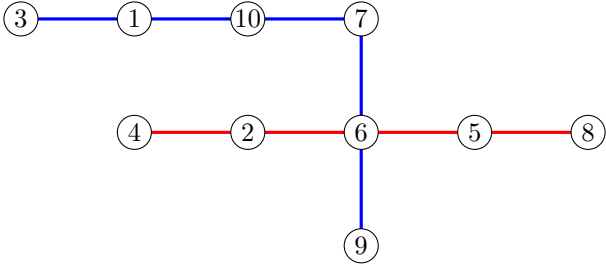
In the **first sample case**, an optimal split would be into 2 edge-disjoint paths, each of length 4: 2 – 1 – 5 – 8 – 9 and 4 – 7 – 8 – 3 – 6.



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.

