F. Language Barrier

Limits: 2.5 sec., 512 MiB

It's not about the money, it's about sending a message.

In a network of n people connected by a tree structure, person 1 wants to send a message to person n. There are 10^9 different languages numbered from 1 to 10^9. Person i speaks all languages in the interval $[l_i, r_i]$.

Person 1 starts with a piece of paper and can write the initial message in any language they speak. On each turn, the person currently holding the paper can do one of the following.

- Pass the paper to a neighboring person in the tree.
- If they understand the language currently written on the paper, translate it to any other language they speak (overwriting the original).

Find the minimum number of turns for person n to receive the paper with a message written in a language they understand.

Input

The first line contains a single integer n – the number of people.

The next $n-1$ lines each contain two integers u and v, describing an edge between people u and v in the tree.

The next n lines each contain two integers l_i and r_i – the interval describing the languages that person i speaks.

Output

Print a single integer – the minimum number of turns needed for person n to receive the message in a language they understand.

Constraints

$2 \le n \le 2 \cdot 10^5$
$1 \le u, v \le n$ for all edges,
$u \ne v$ for all edges,
$1 \le l_i \le r_i \le 10^9$,
it is guaranteed that any person can send a message to any other person (possibly requiring a series of translations).

Samples

Input (*stdin*)	Output (*stdout*)
4 1 2 2 3 3 4 1 3 2 4 3 5 4 6	4

Notes

In the sample, the tree is a path.

Person 1 speaks languages 1, 2, 3. Person 2 speaks languages 2, 3, 4. Person 3 speaks languages 3, 4, 5. Person 4 speaks languages 4, 5, 6.

One optimal solution is as follows. First, person 1 writes the message in language 3. Then the people start to make turns.

1. Person 1 passes the paper to person 2.
2. Person 2 translates the message from language 3 into language 4.
3. Person 2 passes the paper to person 3.
4. Person 3 passes the paper to person 4.

Person 4 now has the message in language 4, which they understand. The minimum number of turns needed is four.