

## 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

$$2 \leq n \leq 2 \cdot 10^5$$

$$1 \leq u, v \leq n \text{ for all edges,}$$

$$u \neq v \text{ for all edges,}$$

$$1 \leq l_i \leq r_i \leq 10^9,$$

it is guaranteed that any person can send a message to any other person (possibly requiring a series of translations).

### Samples

Input ( <i>stdin</i> )	Output ( <i>stdout</i> )
<pre>4 1 2 2 3 3 4 1 3 2 4 3 5 4 6</pre>	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.