COI '16 #4 Zagrade

Time limit: 3.0s **Memory limit:** 1G

An *expression* is a string consisting only of properly paired brackets. For example, `()()` and `((()))` are expressions, whereas `)(` and `()(` are not. We can define expressions inductively as follows:

- `()` is an expression.
- If a is an expression, then (a) is also an expression.
- If a and b are expressions, then ab is also an expression.

A *tree* is a structure consisting of n nodes denoted with numbers from 1 to n and $n-1$ edges placed so there is a unique path between every two nodes. Additionally, a single character is written in each node. The character is either an open bracket `(` or a closed bracket `)`. For different nodes a and b, $w_{a,b}$ is a string obtained by traversing the unique path from a to b and, one by one, adding the character written in the node we're passing through. The string $w_{a,b}$ also contains the character written in node a (at the first position) and the character written in node b (at the last position).

Find the total number of pairs of different nodes a and b such that $w_{a,b}$ is a correct expression.

Input Specification

The first line contains the integer n — the number of nodes in the tree. The following line contains an n-character string where each character is either `)` or `(`, the j^{th} character in the string is the character written in the node j. Each of the following $n-1$ lines contains two different positive integers x and y $(1 \leq x, y \leq n)$ — the labels of nodes directly connected with an edge.

Output Specification

Output the required number of pairs.

Constraints

Subtask	Score	Constraints
1	10	$n \leq 1\,000$
2	30	$n \leq 300\,000$, the tree is a chain — each node $x = 1, \ldots, n-1$ is connected to node $x+1$.
3	60	$n \leq 300\,000$

Sample Input 1

```
4
(())
1 2
2 3
3 4
```

Sample Output 1

```
2
```

Sample Input 2

```
5
())((
1 2
2 3
2 4
3 5
```

Sample Output 2

```
3
```

Sample Input 3

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

Sample Output 3

```
6
```