Problem B Balanced Tree Path

You are given a tree where each node is annotated with a character from ()[] {}. A path is a sequence of one or more nodes where no node is repeated and every pair of adjacent nodes is connected with an edge. A path is balanced if the characters at each node, when concatenated, form a balanced string. A string is balanced if it satisfies the following definition:

- An empty string is balanced.
- If s is a balanced string, then (s), [s], and $\{s\}$ are balanced strings.
- if a and b are balanced strings, then ab (a concatenated with b) is a balanced string.

Compute the number of balanced paths over the entire tree.

Input

The first line of input contains a single integer n ($2 \le n \le 5 \cdot 10^3$).

The next line contains a string of n characters, where each character is one of ()[]{}.

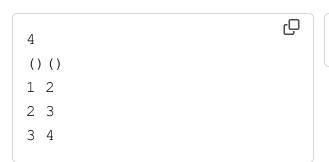
Each of the next n-1 lines contains two integers, u and v ($1 \le u < v \le n$), indicating that nodes u and v are connected with an edge. It is guaranteed the graph is a tree.

Output

Output a single integer, which is the number of balanced paths over the entire tree.

Sample Input 1

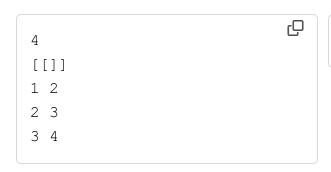
Sample Output 1





Sample Input 2

Sample Output 2





Sample Input 3

Sample Output 3



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