

E. Misha and LCP on Tree

time limit per test: 8 seconds

memory limit per test: 512 megabytes

Misha has a tree with characters written on the vertices. He can choose two vertices s and t of this tree and write down characters of vertices lying on a path from s to t . We'll say that such string corresponds to pair (s, t) .

Misha has m queries of type: you are given 4 vertices a, b, c, d ; you need to find the largest common prefix of the strings that correspond to pairs (a, b) and (c, d) . Your task is to help him.

Input

The first line contains integer n ($1 \leq n \leq 300\,000$) — the number of vertices in the tree.

Next follows a line consisting of n small English letters. The i -th character of the string corresponds to the character written on the i -th vertex.

Next $n - 1$ lines contain information about edges. An edge is defined by a pair of integers u, v ($1 \leq u, v \leq n, u \neq v$), separated by spaces.

The next line contains integer m ($1 \leq m \leq 1\,000\,000$) — the number of queries.

Next m lines contain information about queries. A query is defined by four integers a, b, c, d ($1 \leq a, b, c, d \leq n$), separated by spaces.

Output

For each query print the length of the largest common prefix on a separate line.

Examples

input

Copy

6
bbbabb
2 1
3 2
4 3
5 2
6 5
6
2 5 3 1
1 5 2 3
5 6 5 6
6 3 4 1
6 2 3 4
2 2 4 5

output

Copy

2
2
2
0
1
0

Codeforces Round 285 (Div. 1)

Finished

Practice



→ Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

→ Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

→ Submit?

Language: GNU G++20 13.2 (64 bit, win

Choose file: Choose File No file chosen

Submit

→ Last submissions

Submission	Time	Verdict
318671912	May/06/2025 23:54	Accepted
318663538	May/06/2025 21:39	Time limit exceeded on test 6
318662988	May/06/2025 21:32	Time limit exceeded on test 6

→ Problem tags

binary search

dfs and similar

hashing

string suffix structures

trees

*3000

No tag edit access

→ Contest materials

Codeforces Round #285

Tutorial #1 (ru)

Tutorial #2 (en)