C. Sereja and Brackets

time limit per test: 1 second
memory limit per test: 256 megabytes

Sereja has a bracket sequence $s_1, s_2, ..., s_n$, or, in other words, a string s of length n, consisting of characters "(" and ")".

Sereja needs to answer m queries, each of them is described by two integers l_i, r_i $(1 \le l_i \le r_i \le n)$. The answer to the i-th query is the length of the maximum correct bracket subsequence of sequence $s_{l_i}, s_{l_i+1}, ..., s_{r_i}$. Help Sereja answer all queries.

You can find the definitions for a subsequence and a correct bracket sequence in the notes.

Input

The first line contains a sequence of characters $s_1, s_2, ..., s_n$ $(1 \le n \le 10^6)$ without any spaces. Each character is either a "(" or a ")". The second line contains integer m $(1 \le m \le 10^5)$ — the number of queries. Each of the next m lines contains a pair of integers. The i-th line contains integers l_i, r_i $(1 \le l_i \le r_i \le n)$ — the description of the i-th query.

Output

Print the answer to each question on a single line. Print the answers in the order they go in the input.

Examples

input Copy

```
())(())(())(
7
1 1
2 3
1 2
1 12
8 12
5 11
2 10
```

output Copy

```
0
0
2
10
4
6
6
```

Note

A *subsequence* of length $|x|$ of string $s = s_1 s_2 ... s_{|s|}$ (where $|s|$ is the length of string s) is string $x = s_{k_1} s_{k_2} ... s_{k_{|x|}}$ $(1 \le k_1 < k_2 < ... < k_{|x|} \le |s|)$.

A *correct bracket sequence* is a bracket sequence that can be transformed into a correct aryphmetic expression by inserting characters "1" and "+" between the characters of the string. For example, bracket sequences "()()", "(())" are correct (the resulting expressions "(1)+(1)", "((1+1)+1)"), and ")(" and "(" are not.

For the third query required sequence will be «()».

For the fourth query required sequence will be «()(())(())».

Codeforces Round 223 (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
282812787	Sep/24/2024 20:03	Accepted
282810692	Sep/24/2024 19:47	Time limit exceeded on test 13
282802575	Sep/24/2024 18:53	Time limit exceeded on test 13

→ Problem tags

data structures schedules *2000

No tag edit access

→ Contest materials

- Codeforces Round #223
- Tutorial