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## C. Sereja and Brackets

time limit per test: 1 second  
 memory limit per test: 256 megabytes  
 input: standard input  
 output: standard output

Sereja has a bracket sequence  $s_1, s_2, \dots, s_n$ , 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  $l_i, r_i$  ( $1 \leq l_i \leq r_i \leq n$ ). The answer to the  $i$ -th query is the length of the maximum correct bracket subsequence of sequence  $s_{l_i}, s_{l_i+1}, \dots, s_{r_i}$ . 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  $s_1, s_2, \dots, s_n$  ( $1 \leq n \leq 10^6$ ) without any spaces. Each character is either a "(" or a ")". The second line contains integer  $m$  ( $1 \leq m \leq 10^5$ ) — the number of queries. Each of the next  $m$  lines contains a pair of integers. The  $i$ -th line contains integers  $l_i, r_i$  ( $1 \leq l_i \leq r_i \leq n$ ) — 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
<pre> ()()()()() 7 1 1 2 3 1 2 1 12 8 12 5 11 2 10 </pre>
output
<pre> 0 0 2 10 4 6 6 </pre>

### Note

A *subsequence* of length  $|x|$  of string  $s = s_1s_2\dots s_{|s|}$  (where  $|s|$  is the length of string  $s$ ) is string  $x = s_{k_1}s_{k_2}\dots s_{k_{|x|}}$  ( $1 \leq k_1 < k_2 < \dots < k_{|x|} \leq |s|$ ).

A *correct bracket sequence* is a bracket sequence that can be transformed into a correct arphmetic 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 « () ».

### Codeforces Round #223 (Div. 1)

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### → 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 ACM-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.

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### → Practice

You are registered for practice. You can solve problems unofficially. Results can be found in the contest status and in the bottom of standings.

### → Submit?

Language: GNU G++11 5.1.0

Choose file: [Choose File](#) No file chosen

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

[Submit](#)

### → Last submissions

Submission	Time	Verdict
<a href="#">20767347</a>	Sep/20/2016 05:39	Accepted



### → Problem tags

[data structures](#) [schedules](#)

No tag edit access

### → Contest materials

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

- [Announcement](#) 
- [Tutorial](#) 

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