L. Expression Queries

time limit per test: 4 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

A *simplified arithmetic expression* (SAE) is an arithmetic expression defined by the following grammar:

- `<SAE> ::= <Number> | <SAE>+<SAE> | <SAE>*<SAE> | (<SAE>)`
- `<Number> ::= <Digit> | <Digit><Number>`
- `<Digit> ::= 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9`

In other words it's a correct arithmetic expression that is allowed to contain brackets, numbers (possibly with leading zeros), multiplications and additions. For example expressions "`(0+01)`", "`0`" and "`1*(0)`" are simplified arithmetic expressions, but expressions "`2-1`", "`+1`" and "`1+2)`" are not.

Given a string $s_1 s_2 \ldots s_{|s|}$ that represents a SAE; s_i denotes the i-th character of the string which can be either a digit ('`0`'-'`9`'), a plus sign ('`+`'), a multiplication sign ('`*`'), an opening round bracket '`(`' or a closing round bracket '`)`'.

A part $s_l s_{l+1} \ldots s_r$ of this string is called a *sub-expression* if and only if it is a SAE.

You task is to answer m queries, each of which is a pair of integers l_i, r_i $(1 \le l_i \le r_i \le |s|)$. For each query determine whether the corresponding part of the given string is a sub-expression and in case it's a sub-expression calculate its value modulo 1000000007 $(10^9 + 7)$. The values should be calculated using standard operator priorities.

Input

The first line of the input contains non-empty string s $(1 \le |s| \le 4 \cdot 10^5)$ which represents a correct SAE. Each character of the string can be one of the following characters: '`*`', '`+`', '`(`', '`)`' or a digit ('`0`'-'`9`'). The expression might contain extra-huge numbers.

The second line contains an integer m $(1 \le m \le 4 \cdot 10^5)$ which is the number of queries. Each of the next m lines contains two space-separated integers l_i, r_i $(1 \le l_i \le r_i \le |s|)$ — the i-th query.

Output

The i-th number of output should be the answer for the i-th query. If the i-th query corresponds to a valid sub-expression output the value of the sub-expression modulo 1000000007 $(10^9 + 7)$. Otherwise output -1 as an answer for the query. Print numbers on separate lines.

Examples

input
((1+2)*3+101*2) 6 8 14 1 6 2 10 11 14 5 5 4 5

output
205 -1 10 2 2 -1

input

```
(01)
1
1 4
```

output

```
1
```