Problem A. Mango

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	512 mebibytes

Mango is a cat that lives next door. The name comes from the fact that its color is similar to the color of mango juice. I don't know if Mango likes this name.

Like most cats, Mango is cute. Mango, which many people like, sometimes becomes the subject of humorous jokes such as "The Mango looks delicious" or "That's a cat, not a mango." Recently, Mango has become the hero of a meme about generation of the following recursive sentences.

Let's say we have the initial string M_0 and the rule string S. For any positive integer i, M_i is defined as the string in which each "`$`" character is replaced with the string M_{i-1}.

It is easy to construct the first few such strings. For example, if we say that M_0 is "That's a cat, not a mango", and S is "`That's a "$", not a "$"`", then M_0, M_1, and M_2 look as follows:

- M_0: "`That's a cat, not a mango`".
- M_1: "`That's a "That's a cat, not a mango", not a "That's a cat, not a mango"`".
- M_2: "`That's a "That's a "That's a cat, not a mango", not a "That's a cat, not a mango"", not a "That's a "That's a cat, not a mango", not a "That's a cat, not a mango""`".

Not only M_3 and M_4, but also M_{1000} can be constructed using the same principle. However, even M_5 is already quite long. Still, I wonder, for the string M_k and several pairs (a, b), what is the substring of M_k from the a-th to the b-th character, inclusive. Write a program that finds the answers to these queries.

Input

The first line contains the initial string M_0.

The second contains the rule string S.

The input strings satisfy the following conditions:

- The length of each string is not less than 1 and not more than 10^5.
- All characters in each string have an ASCII code value between 33 and 126, inclusive. Note that whitespace is not included.
- M_0 does not contain any "`$`" (ASCII code 36) characters.
- S contains at least one "`$`" (ASCII code 36) character.

The third line contains two integers k and q ($1 \le k \le 10^5$, $1 \le q \le 10^5$).

Each of the next q lines contains a query: two integers a_i and b_i ($1 \le a_i \le b_i \le 10^{18}$, $b_i - a_i < 10^5$). It is guaranteed that b_i does not exceed the length of M_k.

Output

Print q lines.

On line i, print a total of $b_i - a_i + 1$ characters: the substring of M_k from a_i-th character to b_i-th character inclusive.

It is guaranteed that, in the correct answer, the total number of characters printed (excluding line breaks) will not exceed $5 \cdot 10^5$.

Examples

standard input	standard output
It's_a_cat,_not_a_mango It's_"$",_not_"$" 1 6 1 20 18 35 49 61 29 40 41 50 5 5	It's_"It's_a_cat,_no _not_a_mango",_not _not_a_mango" o",_not_"It' s_a_cat,_n _
Ad_finitum $ 100000 4 1 10 1 2 4 10 5 8	Ad_finitum Ad finitum init
THE_END $_IS_NEVER_$_IS_NEVER_$ 88 5 1 7 3256 3257 67706 67710 111011 111017 999999999999999968 999999999999999993	THE_END IS NEVER THE_END _THE_END_IS_NEVER_THE_END_