Problem 1008. AC/DC

Description

J likes playing electric guitar, especially the famous guitar model - Gibson SG Standard. He always composes music with his Gibson SG Standard.

A tune he composes is made up of several notes. Formally, a **tune** can be regarded as a string consisting of only lower-case letters. Different letters stands for different notes. A substring of a tune is called **phrase**.

At the beginning, J has a tune of length n. To create new music, J has three operations:

- `1 c` : Insert a note c at the end of the current tune.
- `2` : Delete the note at the beginning of the current tune.
- `3 t` : Query the number of the phrase t appears in the current tune.

Now, J is busy with his new album and invites you to write music together. Can you help him with it?

Input

The first line contains a single integer T $(1 \leq T \leq 5)$, the number of test cases. For each test case:

The first line contains a string S of length n $(1 \leq n \leq 10^5)$, the initial tune.

The next line contains one integer m $(1 \leq m \leq 10^5)$, the number of operations.

For the following m lines, the i-th line contains an operation like `1 c'`, `2` or `3 t'`.

Let's define the last answer as $lastans$. At the beginning, $lastans = 0$.

- For `1 c'`, the real operation is $c = ((c' -' a') \oplus lastans) \bmod 26 +' a'$.
- For `3 t'`, the real operation is for every $1 \leq i \leq |t|$, $t_i = ((t'_i -' a') \oplus lastans) \bmod 26 +' a'$.

It's guaranteed that c is a lower-case letter. t is a string consisting only of lower-case letters. The sum of the lengths of t of all test cases will not exceed 5×10^6.

Note that string S may be deleted to an empty string. But it's guaranteed that there will be no operations of type 2 at this time.

Output

For each query `3 t`, print a single integer in a single line to represent the answer.

Example Input

```
1
abcbaba
5
3 ab
3 c
1 a
2
3 da
```

Example Output

```
2
3
1
```