
Ternary String Revolution

Input file: **standard input**
Output file: **standard output**
Time limit: **1 second**
Memory limit: **256 megabytes**

A ternary string is a sequence of digits, where each digit is either 0, 1, or 2.

For a ternary string, Chiaki can perform any of the following operations:

- Replace one occurrence of 00 to 12 or vice versa. For example, 120011 can change to 121211 or 000011.
- Replace one occurrence of 111 to 20 or vice versa. For example, 1112011 can change to 202011 or 1111111.
- Remove one occurrence of 22 or put string 22 on any position (you can also put it at the beginning or the ending of the string). For example, 1221 can change to 11, 221221, 122221 or 122122.
- Remove one occurrence of 012 or put string 012 on any position (you can also put it at the beginning or the ending of the string). For example, 10121 can change to 11, 01210121, 10120121, 10012121, 10101221, 10120121 or 10121012.

Chiaki has a ternary string s of length n and m other ternary strings t_1, t_2, \dots, t_m . For each ternary string t_i , she would like to know the number of pairs (l, r) ($1 \leq l \leq r \leq n$) such that the substring $s_{l..r}$ can become t_i after performing several above operations.

Input

There are multiple test cases. The first line of input contains an integer T , indicating the number of test cases. For each test case:

The first line contains two integers n and m ($1 \leq n, m \leq 10^6$) – the length of s and the number of other ternary strings.

The second line contains a ternary string s of length n .

Each of the next m lines contains a ternary string t_i ($1 \leq |t_i| \leq 10^6$).

It is guaranteed that the sum of the length of all strings over all test cases does not exceed 2×10^6 .

Output

For each test cases, output m lines, where the i -th line contains an integer denoting the answer for ternary string t_i .

Example

standard input	standard output
2	6
11 4	3
01021001020	4
0	0
1	2
2	4
012	4
6 3	
012210	
0	
1	
2	