Problem A. PATTERN STRING
Time Limit: 4 second

Problem Description

Using data compression technique, the long string "ruiruiruiruiruirui" can be compressed into "(ruirui)3" or "(rui)6". To simplify the technique, multiple compressions are not allowed. For example, we **don't allow** to compress the string "princessruiruiprincessruirui" into "(princess(rui)2)2".

Now for given string S and k patterns using the mentioned technique, we want to distinguish each pattern which is a prefix of S. We emphasize that a pattern as a string can be cyclic shifted. For example, a pattern "abcd" can be shifted into "bcda", "cdab" or "dabc".

Input

The first line contains an integer t ($1 \leq t \leq 13$) which is the number of test cases.

For each test case, the first line is the string S. The second line contains the integer $k(1 \leq k \leq 10)$ and following k lines list the patterns, labelled from 1 to k. The string S and all patterns only contain lower-case letters, numbers and parentheses. Numbers of replication are positive integers no more than 2×10^8. The length of S is no more than 11000. The length of each pattern is no more than 11000 as well. We guarantee that the actual length of each T (the length of the original pattern without compression) would be smaller than the actual length of S (the length of original S without compression). The length of each substring given in parentheses is no more than 10.

Output

For each test case, output the sum of labels' squares for patterns as the prefix of S.

Sample Input

```
3
z(rz)3r(rui)2cumt
5
```

```
(zr)4
zrzrrui
zr(zr)2z(r)2u
(rz)3
(zr)2z(r)2zr
(ab)2aab(aba)3(ba)2(zhang)940712
4
(babaa)2(baa)2
(aabab)2
(ab)3
(aba)2(ab)3a(ab)2(a)2b
(a)100b(a)100c(a)100d
1
(a)100d(a)100c(a)100b
```

Sample Output

```
Case #1: 51
Case #2: 21
Case #3: 0
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Hint

In the first test case, the string S is "zrzrzrzrruiruicumt". The first pattern "zrzrzrzr" is a prefix of S. The third one "zrzrzrzrru" is a prefix of S as well. The fourth on can be shifted into "zrzrzr" and the fifth one can be shifted into "zrzrzrzrr". The sum of squares is $1^2 + 3^2 + 4^2 + 5^2 = 51$.