1676   GRE Words Revenge

Now Coach Pang is preparing for the Graduate Record Examinations as George did in 2011. At each day, Coach Pang can:

- '+w': learn a word w

- '?p': read a paragraph p, and count the number of learnt words. Formally speaking, count the number of substrings of p which is a learnt words.

Given the records of N days, help Coach Pang to find the count. For convenience, the characters occured in the words and paragraphs are only '0' and '1'.

Input

The first line of the input file contains an integer T, which denotes the number of test cases. T test cases follow.

The first line of each test case contains an integer N ($1 \leq N \leq 10^5$), which is the number of days. Each of the following N lines contains either '+w' or '?p'. Both p and w are 01-string in this problem.

Note that the input file has been *encrypted*. For each string occured, let L be the result of last '?' operation. The string given to you has been shifted L times (the shifted version of string $s_1 s_2 \ldots s_k$ is $s_k s_1 s_2 \ldots s_{k-1}$). You should decrypt the string to the original one before you process it. Note that L equals to 0 at the beginning of each test case.

The test data guarantees that for each test case, total length of the words does not exceed 10^5 and total length of the paragraphs does not exceed $5 \cdot 10^6$.

Output

For each test case, first output a line 'Case #x:', where x is the case number (starting from 1). And for each '?' operation, output a line containing the result.

Sample Input

```
2
3
+01
+01
?01001
3
+01
?010
?011
```

Sample Output

```
Case #1:
2
Case #2:
1
0
```