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
```