Sequential Prefix Function



The *prefix function* of a sequence of integers, $s=s_0,\ldots s_{n-1}$, is defined as follows:

- 1. 0 if s is empty (i.e., n = 0).
- 2. The maximal $0 \leq k < n$ such that $(s_0, s_1, \ldots s_{k-1}) = (s_{n-k}, \ldots s_{n-1})$ if $n \geq 1$.

You have a sequence of integers that's initially empty. You have two types of queries:

- 1. + x: Append integer x to the end of the sequence.
- 2. -: Remove the last integer from the sequence.

After each query, print the value of the prefix function of the whole string on a new line.

Input Format

The first line contains a single integer, n, denoting the number of queries.

Each line i of the n subsequent lines contains one query each, and each query is in the format $+ \times$ or -.

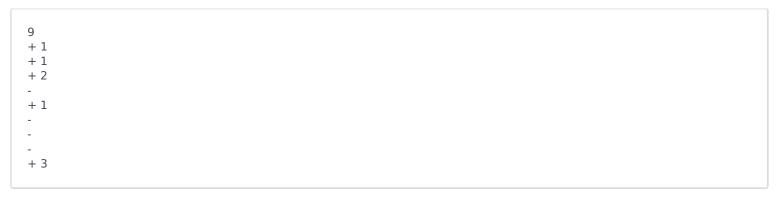
Constraints

- $1 < n < 2 \cdot 10^5$
- $1 \le x \le 10^6$

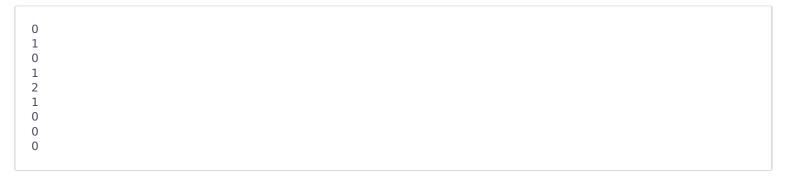
Output Format

After each query, print a single integer denoting the value of the prefix function.

Sample Input



Sample Output



Explanation

The list of sequences (in order) is:

- 1. Append 1 to the sequence, resulting in (1).
- 2. Append 1 to the sequence, resulting in (1,1).
- 3. Append 2 to the sequence, resulting in (1,1,2).
- 4. Remove the last value from the sequence, resulting in (1,1).
- 5. Append 1 to the sequence, resulting in (1,1,1).
- 6. Remove the last value from the sequence, resulting in (1,1).
- 7. Remove the last value from the sequence, resulting in (1).
- 8. Remove the last value from the sequence, resulting in ().
- 9. Append 3 to the sequence, resulting in (3).

At each step, we print the value of the prefix function on a new line.