D. Vasiliy's Multiset

time limit per test: 4 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Author has gone out of the stories about Vasiliy, so here is just a formal task description.

You are given q queries and a multiset A, initially containing only integer 0. There are three types of queries:

1. "+ x" — add integer x to multiset A.
2. "- x" — erase one occurrence of integer x from multiset A. It's guaranteed that at least one x is present in the multiset A before this query.
3. "? x" — you are given integer x and need to compute the value $\max\limits_{y \in A}(x \oplus y)$, i.e. the maximum value of bitwise exclusive OR (also know as XOR) of integer x and some integer y from the multiset A.

Multiset is a set, where equal elements are allowed.

Input

The first line of the input contains a single integer q ($1 \le q \le 200\,000$) — the number of queries Vasiliy has to perform.

Each of the following q lines of the input contains one of three characters '+', '-' or '?' and an integer x_i ($1 \le x_i \le 10^9$). It's guaranteed that there is at least one query of the third type.

Note, that the integer 0 will always be present in the set A.

Output

For each query of the type '?' print one integer — the maximum value of bitwise exclusive OR (XOR) of integer x_i and some integer from the multiset A.

Example

input   Copy

```
10
+ 8
+ 9
+ 11
+ 6
+ 1
? 3
- 8
? 3
? 8
? 11
```

output   Copy

```
11
10
14
13
```

Note

After first five operations multiset A contains integers $0, 8, 9, 11, 6$ and 1.

The answer for the sixth query is integer $11 = 3 \oplus 8$ — maximum among integers $3 \oplus 0 = 3, 3 \oplus 9 = 10$, $3 \oplus 11 = 8, 3 \oplus 6 = 5$ and $3 \oplus 1 = 2$.