Can you answer these queries VIII

You are given sequence A[0], A[1]...A[N - 1]. (0 <= A[i] < 2^32)

You are to perform Q operations:

1. **I pos val**, insert number **val** in sequence before element with index **pos**. (0 <= val < 2^32, if **pos** = **current_length** then you should add number to the end of the sequence)

2. **D pos**, delete element with index **pos** from sequence.

3. **R pos val**, replace element with idex **pos** by **val**. (0 <= val < 2^32)

4. **Q l r k**, answer Σ A[i] * (i - l + 1)^k modulo 2^32, for l <= i <= r. (0 <= k <= 10)

Input

The first line of the input contains an integer N (1 <= N <= 100000).

The following line contains N integers, representing the starting sequence A[0]..A[N-1].

The third line contains an integer Q (0 <= Q <= 100000).

Next lines contains queries in given format.

Output

For each **"Q"** operation, print an integer(one per line) as described above.

Example

Input:
4
1 2 3 5
7
Q 0 2 0
I 3 4
Q 2 4 1
D 0
Q 0 3 1
R 1 2
Q 0 1 0

Output:
6
26
40
4