B. Electron Motion

Time Limit: 2s
Memory Limit: 2048MB

Volt has designed a machine to study the motion of electrons.

This machine consists of n chambers arranged in a row. Each chamber contains a magnetic field and has a state, which can be either `+` or `-`.

The motion of an electron follows these rules:

- Suppose an electron is in chamber i.
- If the state of chamber i is `-`, the electron moves left to chamber $i - 1$; otherwise, it moves right to chamber $i + 1$.
- After moving, the state of chamber i flips (from `-` to `+` or from `+` to `-`).
- If the electron moves out of bounds (to position 0 or $n + 1$), the motion stops; otherwise, it continues moving.

Volt proposes the following problem:

- The initial state of each chamber is given as `+`, `-`, or `?`.
- Before the experiment starts, each chamber marked with `?` is randomly assigned `+` or `-` with equal probability ($\frac{1}{2}$ each).
- Volt places an electron in chamber x with probability p_x, allowing it to move until it exits.
- Define ans_i as the probability that exactly i chambers have state `+` when the electron exits.

You need to compute all values of ans_i, modulo 998244353.

Input Format

- The first line contains an integer n.
- The second line contains n integers representing $p_1 \sim p_n$.
- The third line contains a string of length n, where each character is one of `+`, `-`, or `?`, representing the initial state of each chamber.

Output Format

- A single line containing $n + 1$ integers, representing $ans_0 \sim ans_n$.

Sample 1

input

```
3
499122177 748683265 748683265
+?-
```

output

```
748683265 873463809 748683265 623902721
```

Explanation

The initial values of p_i are $\frac{1}{2}, \frac{1}{4}, \frac{1}{4}$.

The computed values of $ans_0 \sim ans_n$ are $\frac{2}{8}, \frac{1}{8}, \frac{2}{8}, \frac{3}{8}$.

One possible motion sequence:

- The electron starts at position 1 with the initial state `+--` .
- The electron moves to position 2, changing the state to `---` .
- The electron moves back to position 1, changing the state to `-+-` .
- The electron moves to position 0, changing the state to `++-` , and the motion stops.

Sample 2

input

```
5
499122177 748683265 873463809 935854081 935854081
?+-??
```

output

```
889061377 935854081 904658945 772079617 701890561 787677185
```

Explanation

The initial probabilities p_i are $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{16}$.

Sample 3 - 10

See the download attachment for details.

Constraints

For all test cases:

- $1 \le n \le 5 \times 10^5$
- $0 \le p_i < 998244353$
- $\left(\sum p_i\right) \bmod 998244353 = 1$

Subtask	$n \le$	Points
1	15	6
2	40	12
3	500	16
4	1500	14
5	6000	16
6	3×10^4	12
7	2×10^5	12
8	5×10^5	12