Problem E. Data Structures Master

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	256 mebibytes

Today, Esmaan decided to prove to the world that he is not ordinary. He went to take the exam to become a data structures master. But the first question of the exam stumped him. Help him solve the problem:

You have a sequence of integers $a_1, a_2, \ldots, a_n$. In addition, you have three empty sequences: A, B, and C.

- Let $f(\ell, r)$ be the maximum among the numbers $a_\ell, a_{\ell+1}, \ldots, a_r$.
- Let $g(p_1, p_2, p_3)$ be $f(\min(p_1, p_2, p_3), \max(p_1, p_2, p_3))$.
- Let S be the sum of the values $g(A_i, B_j, C_k)$ for all possible combinations (i, j, k) where $1 \le i \le \text{size}(A)$, $1 \le j \le size(B)$, and $1 \le k \le \text{size}(C)$.

You need to perform q queries of the following type:

- "X *val*": add the value *val* to the end of sequence X.

After each query, output S modulo 998 244 353.

Input

The first line contains two integers n and q ($1 \le n, q \le 10^5$): the number of elements in the sequence and the number of queries.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^5$): the elements of the sequence.

Then follow q lines, each containing a query in the format "X *val*" ($X \in \{\texttt{A}, \texttt{B}, \texttt{C}\}$, $1 \le val \le n$).

Output

After each query, output a line with a single integer: the current value of S modulo 998 244 353.

Examples

standard input	*standard output*
5 5 2 2 9 1 10 A 5 A 1 C 4 B 1 C 5	0 0 0 19 39
10 10 5 6 5 5 10 4 8 9 5 4 C 8 C 8 B 8 B 2 A 7 C 7 C 4 B 4 A 7 B 5	0 0 0 0 38 57 77 117 234 314