# Cute Young Diagram Counting

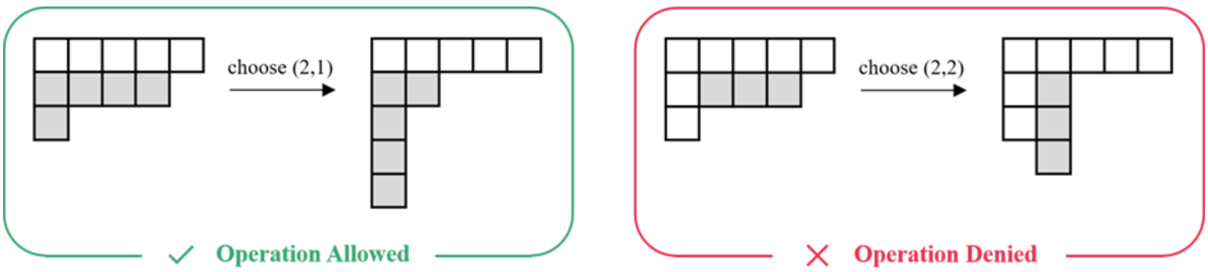
| | |
|---|---|
| Input file: | `standard input` |
| Output file: | `standard output` |
| Time limit: | 2 seconds |
| Memory limit: | 1024 megabytes |

A *Young diagram* is a finite set of cells, arranged in left-aligned rows, with the row lengths in non-increasing order. It can be uniquely represented by an unordered integer partition $\lambda = (\lambda_1, \lambda_2, \ldots, \lambda_r)$ satisfying $\lambda_1 \geq \lambda_2 \geq \cdots \geq \lambda_r \geq 1$, where $r$ corresponds to the number of rows of the Young diagram, and $\lambda_i$ corresponds to the number of cells in the $i$-th row for $i = 1, 2, \ldots, r$.

The *conjugate* of a Young diagram $\lambda$ is another Young diagram obtained by transposing rows and columns, represented by the conjugate partition $\lambda^T$. More specifically, if $\lambda$ has $c = \lambda_1$ columns, then $\lambda^T = (\mu_1, \mu_2, \ldots, \mu_c)$ where $\mu_j = |\{\, i : \lambda_i \geq j \,\}|$ for $j = 1, 2, \ldots, c$.

For a cell at the $i$-th row and the $j$-th column that belongs to $\lambda$, let the *subdiagram* anchored at $(i, j)$ be the set of all cells $(x, y)$ of $\lambda$ with $x \geq i$ and $y \geq j$. It is easy to see that, this set is itself a Young diagram when viewed with $(i, j)$ as its top-left corner.

Define the *cuteness* of a Young diagram $\lambda$ as the number of distinct Young diagrams that can be obtained from $\lambda$ by performing the following operation any number (possibly zero) of times: choose any cell $(i, j)$ of the current Young diagram, take the subdiagram anchored at $(i, j)$, and replace it with its conjugate anchored at the same position. The operation is allowed if and only if the overall set of cells still forms a valid Young diagram; otherwise the operation is denied and undone, as illustrated below.




You are given a non-increasing sequence of positive integers $a_1, a_2, \ldots, a_n$. For each $i = 1, 2, \ldots, n$, compute the cuteness of the Young diagram $\lambda^{(i)}$, modulo 998 244 353, where $\lambda^{(i)} = (a_1, a_2, \ldots, a_i)$.

## Input

The first line contains a single integer $n$ ($1 \leq n \leq 10^6$), denoting the length of the given sequence.

The second line contains $n$ integers $a_1, a_2, \ldots, a_n$ ($1 \leq a_i \leq n$). It is guaranteed that $a_1 \geq a_2 \geq \cdots \geq a_n$.

## Output

Output $n$ integers separated by spaces, where the $i$-th integer represents the cuteness of the Young diagram $\lambda^{(i)}$, modulo 998 244 353.

## Example

| standard input | standard output |
|---|---|
| `3`<br>`3 2 1` | `2 3 1` |

## Note

For the sample case:

- The distinct Young diagrams that can be obtained from $\lambda^{(1)}$ are $(3)$ and $(1, 1, 1)$;
- The distinct Young diagrams that can be obtained from $\lambda^{(2)}$ are $(3, 2)$, $(3, 1, 1)$, and $(2, 2, 1)$;
- The only Young diagram that can be obtained from $\lambda^{(3)}$ is $(3, 2, 1)$ itself.