Kaleidoscope

Input file: `standard input`
Output file: `standard output`
Time limit: 2 seconds
Memory limit: 512 megabytes

Kobato Jiyogoro and Osanai Yuki are investigating the theft of a permutation* $p_1, \ldots, p_n$. There are already some testimonies (x, y) indicating that $p_x = y$. It's guaranteed that the testimonies have no contradictions. In order to find out the suspects, they come up with another problem:

- Two permutations p and q *resemble* each other if and only if the lengths of p and q are the same, and the sets of the prefix maximal positions are the same. A position k of a permutation p is called a prefix maximal position if and only if $p_k = \max(p_1, \ldots, p_k)$.
- Osanai wants to count the number of different permutations q such that there exists a way to fill out all the missing positions in $p_1, \ldots, p_n$ so that p *resembles* q.

Please help Kobato do the calculations. As the answer might be huge, print it modulo 998244353.

Input

Each test contains multiple test cases. The first line of input contains a single integer t ($1 \le t \le 1.8 \cdot 10^3$) — the number of test cases. The description of the test cases follows.

The first line of input contains a single integer n ($1 \le n \le 5 \cdot 10^3$).

The second line of input contains n integers $p'_1, \ldots, p'_n$ ($0 \le p'_i \le n$). If $p'_i = 0$, there is currently no information about p_i; otherwise, there is a testimony indicating that $p_i = p'_i$. It's guaranteed that no pairs (i, j) exist such that $1 \le i < j \le n$ and $p'_i = p'_j > 0$.

It's guaranteed that the sum of n over all test cases does not exceed 10^4.

Output

For each test case, output a single line containing an integer: the number of different permutations that might *resemble* p, modulo 998244353.

*A permutation of length n is an array consisting of n distinct integers from 1 to n in arbitrary order. For example, $[2, 3, 1, 5, 4]$ is a permutation, but $[1, 2, 2]$ is not a permutation (2 appears twice in the array), and $[1, 3, 4]$ is also not a permutation ($n = 3$ but there is 4 in the array).

Example

standard input	standard output
13 3 0 0 2 3 0 1 3 4 0 1 0 0 4 1 3 2 0 4 0 3 0 0 4 0 0 2 1 5 3 1 4 2 5 6 0 0 3 0 5 0 7 0 0 0 0 0 0 0 9 0 0 6 0 0 7 0 0 0 10 0 0 3 1 0 0 2 5 0 0 11 0 0 6 0 3 8 9 0 0 0 0 16 0 0 3 5 0 0 6 0 0 12 0 0 16 0 7 0	4 1 12 2 11 12 3 374 5040 202820 1360800 16287920 399815880

Note

In the first example test case, there are two possible permutations p:

- $p = [1, 3, 2]$. The set of prefix maximal positions is $\{1, 2\}$. There are 2 permutations q that *resemble* p: $[1, 3, 2]$, and $[2, 3, 1]$.
- $p = [3, 1, 2]$. The set of prefix maximal positions is $\{1\}$. There are 2 permutations q that *resemble* p: $[3, 1, 2]$, and $[3, 2, 1]$.

Thus, the answer is $2 + 2 = 4$.

The only possible permutation in the second example test case is $p = [2, 1, 3]$. The set of prefix maximal positions is $\{1, 3\}$, and the only permutation q that *resembles* p is exactly p itself, so the answer is 1.

In the third example test case, all the possible 12 permutations q that might *resemble* p are as follows: $[2, 1, 3, 4]$, $[2, 1, 4, 3]$, $[3, 1, 2, 4]$, $[3, 1, 4, 2]$, $[3, 2, 1, 4]$, $[3, 2, 4, 1]$, $[4, 1, 2, 3]$, $[4, 1, 3, 2]$, $[4, 2, 1, 3]$, $[4, 2, 3, 1]$, $[4, 3, 1, 2]$, and $[4, 3, 2, 1]$. Note that it's possible to have $p = [3, 2, 1, 4]$ and $p = [3, 1, 2, 4]$, both having the prefix maximal set as $\{1, 4\}$, but the corresponding resembling permutations q are still counted only once.