Problem E. Shrooks

Time limit: 2 seconds
Memory limit: 512 megabytes

Shrek wants to place n rooks on a $n \times n$ board, so that the following conditions hold:

- There is exactly 1 rook in each row and each column;
- Manhattan distance between any two rooks doesn't exceed n.

To make things worse, Donkey already placed some rooks (fortunately, each row and each column still contains at most one rook). Find the number of ways to place the remaining rooks so that conditions hold. Since it can be large, output it modulo 998244353.

Here, the Manhattan distance between the rook in the cell on the intersection of row x_1 and column y_1 and the rook in the cell on the intersection of row x_2 and column y_2 is defined as $|x_1 - x_2| + |y_1 - y_2|$.

Input

Each test consists of multiple test cases. The first line contains a single integer t — number of test cases. The description of the test cases follows.

The first line of each test case contains a single integer n — size of the board.

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$. If $a_i = -1$, it means row i doesn't yet have a rook. Otherwise, it indicates that there is a rook at the intersection of row i and column a_i.

Constraints

$1 \le t \le 10^5$,

$2 \le n \le 2 \cdot 10^5$,

the sum of n over all test cases doesn't exceed $2 \cdot 10^5$,

$a_i = -1$ or $1 \le a_i \le n$ for all $1 \le i \le n$,

if $a_i, a_j \ne -1$ for $i \ne j$, then $a_i \ne a_j$.

Output

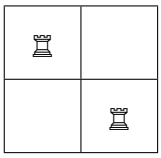
For each test case, output a single integer, the answer modulo 998244353.

Example

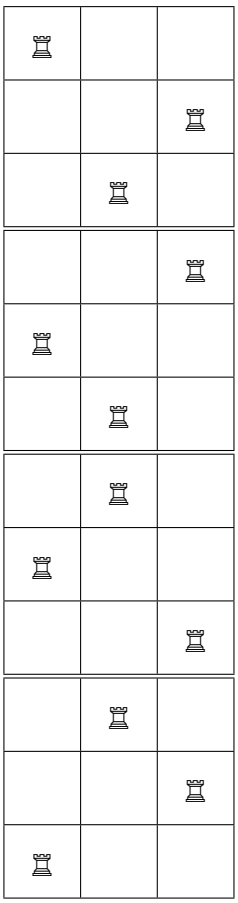
standard input	standard output
6 2 1 2 3 -1 -1 -1 4 1 -1 -1 -1 5 1 -1 -1 -1 5 6 3 -1 -1 -1 -1 4 10 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	1 4 1 0 6 92

Note

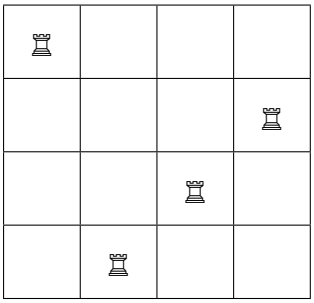
In the **first** test case, the rooks are already placed, and they satisfy the conditions:



In the **second** test case, there are 4 ways to place rooks:



In the **third** test case, there is exactly one such way:



In the **fourth** test case, there are two rooks placed so far:

The manhattan distance between them is already $8 > 5$, so there is no satisfying placement of remaining rooks.

