Fruit Blast

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	512 megabytes

Busy Beaver downloaded a new game on his phone and needs your help to play it!

In this game, a level consists of N^2 starting fruits in a line, each of a type numbered 1 through N, with N fruits of each type. A move consists of the following:

- Choose a subset of N fruits in the line, not necessarily consecutive, such that the chosen fruit types are $k, k+1, \ldots, N, 1, \ldots, k-1$ in order for some $1 \leq k \leq N$, and such that the starting fruit type k is different from that of every previous move.
- Remove the chosen fruits from the line.

Busy Beaver wins the level if he performs N moves that remove every fruit from the line. (Formally: a level is winnable if it can be partitioned into N subsequences, each a distinct cyclic shift of $1, 2, \ldots, N$.)

You are given an array of N^2 integers $a_1, \ldots, a_{N^2}$, each in the range $[0, N]$. Count the number of ways to replace each 0 in the array with an integer in $[1, N]$, so that the resulting sequence is a winnable level. Output the answer modulo $10^9 + 7$.

Input

The first line contains a single integer N ($2 \leq N \leq 11$).

The second line contains N^2 space-separated integers $a_1, \ldots, a_{N^2}$ ($0 \leq a_i \leq N$).

It is guaranteed that each value in $[1, N]$ appears at most N times in the array a.

Output

Output a single nonnegative integer: the number of possible winnable levels modulo $10^9 + 7$.

Scoring

There are three subtasks for this problem.

- (20 points): $N = 4$.
- (20 points): $a_i \neq 0$ for all $1 \leq i \leq N^2$.
- (60 points): No additional constraints.

Examples

standard input	standard output
2 0 0 1 0	2
4 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 3	30608

Note

In the first sample, we count two winnable levels:

- The level $[1, 2, 1, 2]$, since we can remove the first and last fruits on move 1 and remove the remaining fruits on move 2.

- The level $[2, 1, 1, 2]$, since we can remove the first two fruits on move 1 and the remaining fruits on move 2.

On the other hand, a level like $[2, 2, 1, 1]$ is not winnable, since it is not possible to choose a different starting fruit type on the second move compared to the first.