# Problem F. PQ tree

| | |
|---|---|
| Input file: | *standard input* |
| Output file: | *standard output* |
| Time limit: | 7 seconds |
| Memory limit: | 256 mebibytes |

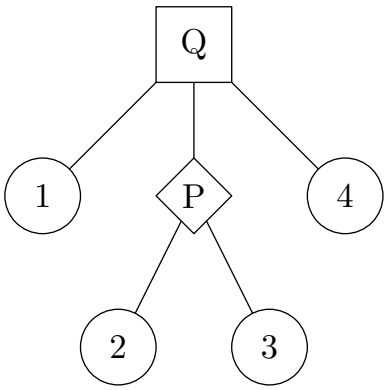
A *PQ tree* is a data structure that represents a family of permutations. The structure is utilized for solving various computational problems such as testing graph planarity or recognizing interval graphs.

A PQ tree on $n$ elements is a rooted tree with vertices of three types: a *P-vertex*, a *Q-vertex*, or a *leaf*. Any P-vertex has at least two children (and its children are initially *unordered*), any Q-vertex has at least three children (and its children are initially *ordered*), and any leaf has no leaves. There are exactly $n$ leaves, and they are associated with distinct integer values from $\{1, \ldots, n\}$.

A permutation $\sigma$ of numbers $\{1, \ldots, n\}$ is *represented* by the given PQ tree if it possible to order the children of all internal (P and Q) vertices in the following way:

- children of a P-vertex are ordered arbitrarily;
- the order of children of a Q-vertex is either left unchanged or *reversed*;
- when the tree is traversed starting from the root according to the chosen children ordering, the leaves are visited in the order given by the permutation $\sigma$.

For example, consider the following PQ tree:




Evidently, the tree represents permutations $(1, 2, 3, 4)$ and $(4, 3, 2, 1)$, but does not represent permutations $(2, 1, 4, 3)$ (since in every ordering, the numbers 2 and 3 must be adjacent) and $(1, 4, 3, 2)$ (since 4 must be located either at the beginning or at the end).

We will consider two PQ trees identical if every permutation represented by the first tree is represented by the second tree, and vice versa; otherwise, the trees are distinct (note that this means that reversing the order of children of a Q-vertex does not change the PQ tree).

You are given $k$ permutations of numbers $\{1, \ldots, n\}$. Count the number of distinct PQ trees on $n$ leaves which represent all given permutations. Print the answer modulo $10^9 + 7$.

## Input

The first line contains two integers $k$ and $n$ ($1 \le k, n \le 500$).

The next $k$ lines contain $n$ space-separated integers each: the given permutations. On each line, the numbers are pairwise distinct and belong to the set $\{1, \ldots, n\}$.

## Output

Print the answer to the problem modulo $10^9 + 7$.

## Examples

| standard input | standard output |
|---|---|
| 1 2<br>1 2 | 1 |
| 2 4<br>1 2 3 4<br>1 2 4 3 | 7 |
| 1 5<br>1 2 3 4 5 | 82 |

## Note

The only tree on two elements is the P-rooted tree with two leaf children (note that Q-vertex must have at least three children).

The seven trees satisfying the second sample are pictured below: