Problem L. Single-Crossing

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	256 mebibytes

The summer has already been long and boring, and to entertain yourself, you started to look over some recent papers. You stumbled upon an interesting problem: Let's consider a list of n permutations $X^1, \ldots, X^n$ over $\{1, 2, \ldots, m\}$. In other words, each X^i is a vector $X^i_1, \ldots, X^i_m$ of size m in which all the numbers from 1 to m appear exactly once. The paper is about rearranging the given permutations such that the new order, let it be $Y^1, \ldots, Y^n$, is single-crossing.

A sequence of permutations $Y^1, \ldots, Y^n$ is called *single-crossing* if and only if, when we choose any three indices $1 \le i < j < k \le n$ and any two distinct values $1 \le a, b \le m$ such that a appears before b in both Y^i and Y^k, it holds that a appears before b in Y^j as well.

In a more intuitive way: we say that $Y^1, \ldots, Y^n$ is single-crossing if and only if any two elements a and b change their relative order at most once (see the image above).

You can't find the paper anymore, but you really want to implement a solution for the problem it proposes. So, given t test cases, find out for each of them if there is such a way to rearrange the permutations to be single-crossing, and, if so, output one possible solution.

Input

The first line contains one number t ($1 \le t \le 5$), the number of test cases.

Each test case is described as follows. The first line contains two integers n and m ($1 \le n \le 10^5$; $1 \le n \cdot m \le 10^6$). Each of the next n lines contains m integers: the permutations $X^1, \ldots, X^n$.

Output

For each of the t test cases, print a single line. If there is no way to rearrange the permutations so that the sequence becomes single-crossing, print `-1`. Otherwise, print a permutation p containing n space-separated integers: the order in which the original permutations could be rearranged.

If there are multiple solutions, output any one of them.

Example

standard input	*standard output*	*explanation*
2 5 4 2 3 1 4 1 2 3 4 2 1 3 4 4 3 2 1 3 2 4 1 4 4 2 1 3 4 1 2 3 4 2 1 4 3 1 2 4 3	2 3 1 5 4 -1	first test case, ordered as 2 3 1 5 4: 1 2 3 4 2 1 3 4 2 3 1 4 3 2 4 1 4 3 2 1