Problem I. Bingo

Time limit: 1 second
Memory limit: 1024 megabytes

Given two integers n, m and an integer sequence $a_1, a_2, \cdots, a_{nm}$ of length $n \times m$, we're going to fill a grid of n rows and m columns with the integers from the sequence. More specifically, let (i, j) be the cell on the i-th row and the j-th column, we'll put the $((i-1) \times m + j)$-th element of the sequence (that is, $a_{(i-1)\times m+j}$) into that cell.

We say an integer k is a "bingo integer" of the sequence, if after filling all the cells, at least one of the two following conditions is satisfied.

- There is at least one row, where all integers in the cells of that row are less than or equal to k.
- There is at least one column, where all integers in the cells of that column are less than or equal to k.

It is easy to see that a sequence may have multiple bingo integers, however in this problem, we're only interested in the smallest bingo integer.

Calculate the sum of the smallest bingo integers for all $(nm)!$ permutations of the given sequence. As the answer may be large, output the answer modulo 998 244 353.

Input

There are multiple test cases. The first line of the input contains an integer T indicating the number of test cases. For each test case:

The first line contains two integers n and m ($1 \le n, m \le 2 \times 10^5$, $1 \le n \times m \le 2 \times 10^5$), indicating the number of rows and columns of the grid.

The second line contains $n \times m$ integers $a_1, a_2, \cdots, a_{nm}$ ($0 \le a_i < 998\,244\,353$) indicating the given sequence.

It's guaranteed that the sum of $n \times m$ of all test cases will not exceed 4×10^5.

Output

For each test case, output one line containing one integer indicating the answer.

Example

standard input	standard output
4 2 2 1 3 2 4 3 1 10 10 10 1 3 20 10 30 3 4 1 1 4 5 1 4 1 9 1 9 8 10	56 60 60 855346687

Note

For the first sample test case, if 1 and 2 are not on the same row or column, then the smallest bingo integer will be 3, otherwise the smallest bingo integer will be 2. There are 8 permutations where 1 and 2 are not on the same row or column, so the answer is $8 \times 3 + (4! - 8) \times 2 = 56$.

For the second sample test case, the smallest bingo integer is always 10, so the answer is $3! \times 10 = 60$.