Problem D. Diamond Rush

Input file:	*standard input*
Output file:	*standard output*
Time limit:	6 seconds
Memory limit:	512 mebibytes

There are $n \times n$ cells on a grid, the top-left cell is at $(1, 1)$ while the bottom-right cell is at (n, n). In the cell (i, j) which is at row i and column j, there are $\left(n^2\right)^{a_{i,j}}$ diamonds.

You start at $(1, 1)$ and move to (n, n). At any cell (i, j), you can move to $(i + 1, j)$ or $(i, j + 1)$, provided that you don't move out of the grid. Clearly, you will make exactly $2n - 2$ steps. When you are at a cell, you can take all the diamonds at this cell, including the starting point $(1, 1)$ and the destination (n, n).

However, some cells are blocked, but you don't know which cells are blocked. Please write a program to answer q queries. In each query, you will be given four integers r_1, r_2, c_1, c_2, and you need to report the maximum number of diamonds that you can take without passing the cells (i, j) such that $r_1 \le i \le r_2$ and $c_1 \le j \le c_2$.

Input

The first line contains a single integer T ($1 \le T \le 5$), the number of test cases. For each test case:

The first line contains two integers n and q ($2 \le n \le 400$, $1 \le q \le 200\,000$) denoting the size of the grid and the number of queries.

Each of the following n lines contains n integers, the i-th line contains $a_{i,1}, a_{i,2}, \ldots, a_{i,n}$ ($1 \le a_{i,j} \le n^2$) denoting the number of diamonds in each cell.

Each of the following q lines contains four integers r_1, r_2, c_1, c_2 ($1 \le r_1 \le r_2 \le n$, $1 \le c_1 \le c_2 \le n$) describing a query. It is guaranteed that you can find at least one valid path in each query.

Output

For each query, print a single line containing an integer: the maximum number of diamonds that you can take. Note that the answer may be extremely large, so please print it modulo $10^9 + 7$ instead.

Example

standard input	standard output
1 2 2 2 3 1 4 1 1 2 2 2 2 1 1	276 336