Problem A

There is an area map that is a rectangular matrix n×m, each cell of the matrix contains the height of a corresponding area part. Peter works for a company that has to build several cities within this area, each of the cities will occupy a rectangle $a \times b$ cells on the map. To start construction works in a particular place Peter Peter needs to remove excess ground from the construction site where a new city will be built. To do so he chooses a cell of the minimum height within this site, and removes excess ground from other cells of the site down to this minimum level. Let's consider that to lower the ground level from h_2 to h_1 ($h_1 \leq h_2$) they need to remove $h_2 - h_1$ ground units.

Let's call a site's position optimal, if the amount of the ground removed from this site is minimal compared to other possible positions. Peter constructs cities according to the following algorithm: from all the optimum site's positions he chooses the uppermost one. If this position is not unique, he chooses the leftmost one. Then he builds a city on this site. Peter repeats this process untill he can build at least one more city. For sure, he cannot carry out construction works on the occupied cells. Would you, please, help Peter place cities according to the algorithm?

Input

The first line contains four space-separated integers: map sizes n, m and city sizes a, b ($1 \leq a \leq n \leq 5000$, $1 \leq b \leq m \leq 5000$). Then there follow n lines, each contains m non-negative space-separated numbers, describing the height matrix. Each number doesn't exceed 10^9.

Output

In the first line output k — the amount of constructed cities. In each of the following k lines output 3 space-separated numbers — the row number and the column number of the upper-left corner of a subsequent construction site, and the amount of the ground to remove from it. Output the sites in the order of their building up.

Problem B

A smile house is created to raise the mood. It has n rooms. Some of the rooms are connected by doors. For each two rooms (number i and j), which are connected by a door, Petya knows their value c_{ij} — the value which is being added to his mood when he moves from room i to room j.

Petya wondered whether he can raise his mood infinitely, moving along some cycle? And if he can, then what minimum number of rooms he will need to visit during one period of a cycle?

Input

The first line contains two positive integers n and m $1 \le n \le 300,\ 0 \le m \le \binom{n}{2}$, where n is the number of rooms, and m is the number of doors in the Smile House. Then follows the description of the doors: m lines each containing four integers i, j, c_{ij} c_{ji} $(1 \le i, j \le n,\ i \ne j,\ -10^4 \le c_{ij} \le 10^4)$. It is guaranteed that no more than one door connects any two rooms. No door connects the room with itself.

Output

Print the minimum number of rooms that one needs to visit during one traverse of the cycle that can raise mood infinitely. If such cycle does not exist, print number 0.

Problem C

Not impressed by the lackluster dating websites currently available to cows (e.g., eHarmoony, Moosk, Plenty of Cows), Farmer John decides to launch a new cow dating site based on a fancy proprietary matching algorithm that matches cows and bulls according to a wide range of their mutual interests.
Bessie, in searching for a partner to the Valentine's Day Barn Dance, has decided to try out this site. After making her account, FJ's algorithm has given her a list of N possible matches ($1 \leq N \leq 10^6$). Going through the list, Bessie concludes that each bull has probability p_i ($0 < p_i < 1$) of accepting an invitation from her for the dance.

Bessie decides to send an invitation to each bull in a contiguous interval of the list. Virtuous as always, she wants exactly one partner. Please help Bessie find the maximum probability of receiving exactly one accepted invitation, if she chooses the right interval.