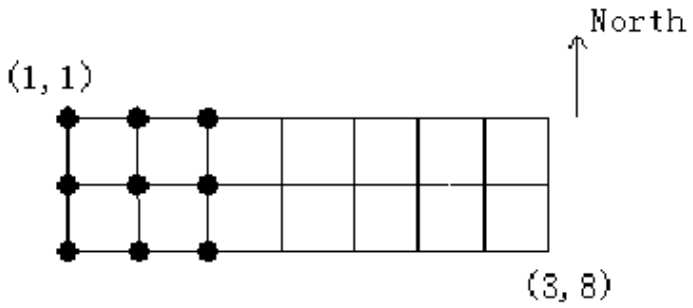
4840 National Day Parade

There are $n \times n$ students preparing for the National Day parade on the playground. The playground can be considered as a $n \times m$ grid. The coordinate of the west north corner is (1,1), and the coordinate of the east south corner is (n, m).



When training, every students must stand on a line intersection and all students must form a $n \times n$ square. The figure above shows a 3×8 playground with 9 students training on it. The thick black dots stand for the students. You can see that 9 students form a 3×3 square.

After training, the students will get a time to relax and move away as they like. To make it easy for their masters to control the training, the students are only allowed to move in the east-west direction. When the next training begins, the master would gather them to form a $n \times n$ square again, and the position of the square doesn't matter. Of course, no student is allowed to stand outside the playground.

You are given the coordinates of each student when they are having a rest. Your task is to figure out the minimum sum of distance that all students should move to form a $n \times n$ square.

Input

There are at most 100 test cases.

For each test case:

The first line of one test case contain two integers n,m. $(n \leq 56, m \leq 200)$

Then there are $n \times n$ lines. Each line contains two integers, $1 \leq X_i \leq n$, $1 \leq Y_i \leq m$ indicating that the coordinate of the i-th student is (X_i, Y_i). It is possible for more than one student to stand at the same grid point.

The input is ended with '`0 0`'.

Output

You should output one line for each test case. The line contains one integer indicating the minimum sum of distance that all students should move to form a $n \times n$ square.

Sample Input

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2 168
2 101
1 127
1 105
2 90
0 0
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Sample Output

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41
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