# Practice Arena

Practice problems aimed to improve your coding skills.

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# The Hidden Positives and Negatives

## LAB-PRAC-10_MAT-FUN

**The Hidden Positives and Negatives [20 marks]**

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**Problem Statement**
The first line of the input will contain two strictly positive numbers m and n. The second line of the input will contain two strictly positive numbers p and q. The next m lines will contain the m rows of an m x n matrix A whose entries are only 0 or 1, with a single space between two entries of a row. The next p lines will contain the p rows of a p x q matrix B whose entries are only 0 or 1, with a single space between two entries of a row.

We suspect that the matrix B is hidden inside the matrix A as a submatrix, or else the complemented matrix B is hidden inside the matrix A as a submatrix (a helpful description of submatrices is given below). It may be the case that B and complemented B are both hiding inside A, possibly multiple times. For a matrix B, its complement is obtained by replacing every 0 by a 1 and every 1 by a 0. For example, the complement of the matrix
1 0 1
0 1 1
is the matrix
0 1 0
1 0 0

Report all instances where matrix B occurs either as itself, or in complemented form, as a submatrix of A, in the manner described below. To report an instance, report the row and column indices of the top left corner of the submatrix in the manner described below. Instances should be reported in increasing order of row and within a row, in increasing order of column of the top left corner of the submatrix, i.e. report all occurrences in the first row (if any) from left to right, then all occurrences in the second row (if any) from left to right, and so on.

**About Submatrices**
Given a string, any contiguous set of characters occurring in that string is considered a substring of that string. Similarly we can extend that notion to submatrices as well. Given any matrix, every contiguous rectangle/square of elements inside that matrix is a submatrix of that matrix. E.g. consider the matrix
1 2 3 4
5 6 7 8
0 2 4 6

Then the following are submatrices of the above matrix. Note that submatrices may be square or rectangular.
Example 1
1

Example 2
6 7 8
2 4 6

Example 3
2 3
6 7

Example 4
1 2 3 4
5 6 7 8
0 2 4 6

**Caution**

1. We will not penalize you for trailing newlines at the end of your output. However, make sure that there are no trailing spaces at the end of any lines in your output.
2. Take care of the capitalization and spacing in your output lines.
3. Be careful to report all occurrences in the first row (if any) from left to right, then all occurrences in the second row (if any) from left to right, and so on.

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**EXAMPLE 1**:
INPUT
2 3
1 1
1 0 1
0 1 0
1

OUTPUT:
POSITIVE MATCH AT (0, 0)
NEGATIVE MATCH AT (0, 1)
POSITIVE MATCH AT (0, 2)
NEGATIVE MATCH AT (1, 0)
POSITIVE MATCH AT (1, 1)
NEGATIVE MATCH AT (1, 2)

**Explanation**: The matrix A is
1 0 1
0 1 0
and the matrix B is
1
and the complemented matrix B is
0

**EXAMPLE 1**:
INPUT
2 3
1 2
1 0 1
0 1 0
1 1

OUTPUT:
NO MATCHES

**Explanation**: The matrix B is

1 1
and it never occurs as a submatrix of A.

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**Grading Scheme**:
Total marks: **[20 Points]**

There will be partial grading in this question. There are several lines in your output. Printing each line correctly, in the correct order, carries equal weightage. Each visible test case is worth 2 points and each hidden test case is worth 4 points. There are 2 visible and 4 hidden test cases.

Please remember, however, that when you press Submit/Evaluate, you will get a green bar only if all parts of your answer are correct. Thus, if your answer is only partly correct, Prutor will say that you have not passed that test case completely, but when we do autograding afterwards, you will get partial marks.

## Start Solving! (/editor/practice/6205)