Practice Arena

Practice problems aimed to improve your coding skills.

- PRACTICE-02_SCAN-PRINT
- PRACTICE-03_TYPES
- LAB-PRAC-02_SCAN-PRINT
- LAB-PRAC-01
- PRACTICE-04_COND
- BONUS-PRAC-02
- LAB-PRAC-03_TYPES
- PRACTICE-05_COND-LOOPS
- LAB-PRAC-04_COND
- LAB-PRAC-05_CONDLOOPS
- PRACTICE-07_LOOPS-ARR
- LAB-PRAC-06_LOOPS
- LAB-PRAC-07_LOOPS-ARR
- LABEXAM-PRAC-01_MIDSEM
- PRACTICE-09_PTR-MAT
- LAB-PRAC-08_ARR-STR
- PRACTICE-10_MAT-FUN
- LAB-PRAC-09_PTR-MAT
- LAB-PRAC-10_MAT-FUN
  - Stack
  - The Prutor Editor
  - Finding your identity
  - Queue
  - The Prutor Editor Part II
  - Only Ones
  - Graphs
  - How Mr C actually does Math
  - The Hidden Positives and Negatives
  - How Prutor Manages Memory
  - Message in the Matrix
  - The Hidden Key
- PRACTICE-11_FUN-PTR
- LAB-PRAC-11_FUN-PTR
- LAB-PRAC-12_FUN-STRUC
- LABEXAM-PRAC-02_ENDSEM
- LAB-PRAC-13_STRUC-NUM
- LAB-PRAC-14_SORT-MISC

Only Ones

LAB-PRAC-10_MAT-FUN

Only Ones [20 marks]

Problem Statement
In the first line of your input, you will be given two strictly positive integers n and m. In the next n lines, you will be given the n rows of an n x m matrix A, with each row on a separate line and two elements in a row separated by a single space. The matrix A will contain entries that are either 0 or 1.

You are allowed to change the matrix given to you by swapping the values at any two positions in the matrix. You can also do any number of swaps in succession. For example, if the given matrix mat is
0 1 1 0
1 0 0 1
0 1 1 1
Then you can swap mat[0][1] with mat[1][1] to get
0 0 1 0
1 1 0 1
0 1 1 1
and then swap mat[0][2] with mat[1][2] to get
0 0 0 0
1 1 1 1
0 1 1 1

You have to find the size (in terms of number of elements) of the largest submatrix of 1s you can create using such swaps. Details about submatrices are given below. Remember, the submatrix should only contain 1s and no zeros.

In the first line of your output, print the number of 1s in the matrix. In the second line of your output, if this number is prime, print 1 else print 0. If the number of 1s is 0 or 1, print the number itself. In the third line of your output, print the size of the largest submatrix of 1s that can be formed using any number of swaps.

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. You may need to do zero or more swaps to find the largest submatrix of 1s.
2. Be careful about extra/missing lines and extra/missing spaces in your output.

HINTS:

1. The first two lines of the output may help you with the final solution.

EXAMPLE:
INPUT
3 4
1 1 1 1
1 1 0 1
1 0 1 0

OUTPUT:
9
0
9

Explanation: Using two successive swaps, we can convert the matrix to
1 1 1 0
1 1 1 0
1 1 1 0
which presents to us the largest submatrix containing only 1s.

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

There will be partial grading in this question. There are three lines in your output. The first two lines are worth 6.25% each. The last line is worth 87.5% marks. 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/6202)