Lithuanian Olympiad in Informatics

Final Round • Nemenčinė, 2019 March 30th-31st • Senior Division `monetos-vyr`

Coins

There are coins placed on squares of a $N \times N$ grid board where N is even. There is one coin in each square. Exactly half of the coins are silver ones, the other half are copper.

The coins are placed *properly* if all the copper coins are in the upper left part of the board and silver coins are placed on the lower right part of the board. To be precise, if the edge of a square is a separator between different types of coins, the copper coin is either to the left or above the silver coin.

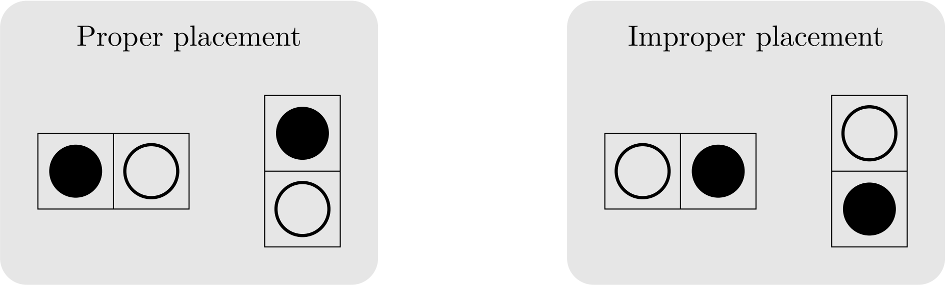


Figure 1 *The coins are placed properly if there are no placements as shown on the right. Black circles represent copper coins, white circles – silver ones.*

Task. You are given a set of coins placed improperly on the board. Rearrange them to get a proper placement by switching as few pairs of coins as possible.

Input. The first line of the input contains four integers – T, N, K_1, K_2:

- T – the number of the test;
- N – board size;
- K_1, K_2 – values that define grading (see section *Grading*).

Each of the remaining N lines contain N integers each. They describe inital coin placement on the board. Availabe integers are 0 (copper coin) or 1 (silver coin).

Output. Output the board with proper placement of coins in a form of $N \times N$ board in the same format as input. Exactly one half of integers should be 0 (copper coin), the other half should be 1.

Example.

Input	Output	Comment

`0 4 1 5`
`0 0 1 0`
`0 0 0 1`
`0 1 1 1`
`1 1 0 1`
	`0 0 1 1`
	`0 0 1 1`
	`0 0 1 1`
	`0 0 1 1`
		The coins in the solution are placed properly. Three pairs of coins were swapped, therefore based on grading description (see section *Grading*), it would score $10 \cdot (6-3)/(6-1) = 6.0$ points.
		All 10 would be awarded for the following solution:
		`0 0 0 0`
		`0 0 0 1`
		`0 1 1 1`
		`1 1 1 1`
		Note that this test is sample test. It does not belong to the set of 10 tests that will be graded.

Grading. There are ten tests numbered from 1 to 10 to grade the solutions. Solutions to each test are evaluated separately and for each test is worth 10 points.

If your program outputs incorrect solution or exceeds time or memory limits, or does not produce a solution due to run-time error or another reason, no points are awarded for the test.

If your program provides correct solution, the awarded points depend upon the number of pairs of coins that have to be swapped in the input to get the solution provided by your program. Let us denote this number as K. For each test you will get full 10 points if $K \leq K_1$. No points will be awarded if $K > K_2$. If K belongs to the interval $[K_1, K_2 + 1]$ the number of awarded points is calculated based on the following formula:

$$10 \cdot \frac{K_2 + 1 - K}{K_2 + 1 - K_1}.$$

Points are awarded at the precision of one decimal digit.

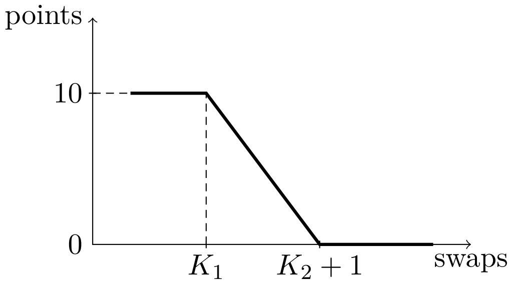
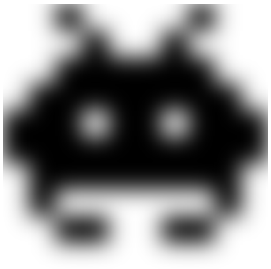
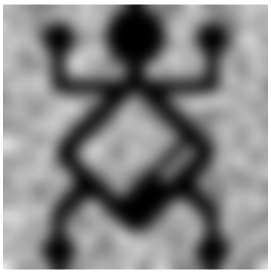
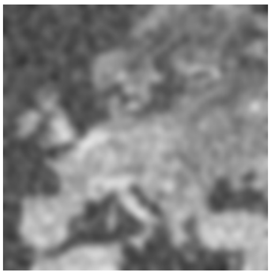
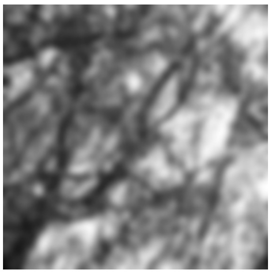
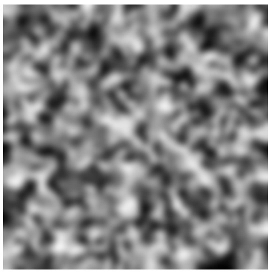
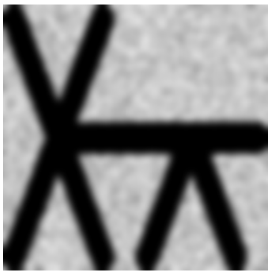
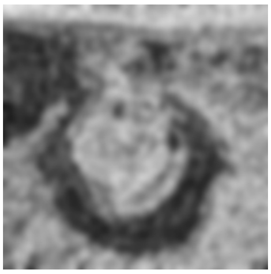


Figure 2 *Points awared for the test.*

Tests. For all the tests used in grading the following constraints are valid: $10 \leq N \leq 300$ and $1 \leq T \leq 10$. The tests are described in the table below. The starting placement of coins is blurred. Darker pixels represent locations with more copper coins and lighter pixels – locations with more silver coins.

Parametrai	Placement of coins
$T = 1$ $N = 10$ $K_1 = 17$ $K_2 = 17$	
$T = 2$ $N = 50$ $K_1 = 576$ $K_2 = 576$	
$T = 3$ $N = 300$ $K_1 = 18\,657$ $K_2 = 20\,540$	
$T = 4$ $N = 300$ $K_1 = 21\,839$ $K_2 = 23\,547$	
$T = 5$ $N = 300$ $K_1 = 17\,169$ $K_2 = 18\,746$	

Parametrai	Monetų išdėstymas
$T = 6$ $N = 300$ $K_1 = 20\,873$ $K_2 = 22\,346$	
$T = 7$ $N = 300$ $K_1 = 21\,477$ $K_2 = 22\,656$	
$T = 8$ $N = 300$ $K_1 = 19\,614$ $K_2 = 20\,153$	
$T = 9$ $N = 300$ $K_1 = 20\,777$ $K_2 = 21\,095$	
$T = 10$ $N = 300$ $K_1 = 20\,150$ $K_2 = 22\,609$	