Week 1

Handout: 20.09.2023 18:00
Due: 04.10.2023 16:00

Autumn 2023

AlgoLab

</> Even Matrices

Even Matrices

You are still part of a team to develop a pseudorandom number generator. Your generator has already passed some simple statistical tests, but now it is time to get serious. You arrange a list of bits produced by the generator in an by matrix. If was a truly random matrix of bits, then it would have the property that the sum is even for about half of the quadruples , and .

To check whether this is the case for your generator, you need to be able to count the number of such quadruples.

Input

The first line of the input contains the number of test cases. Each of the test cases is described as follows.

- It starts with a line that contains an integer n such that .
- This is followed by lines, where the -th line contains the integers , separated by a space, such that , for all and .

Output

For each test case output a single line that contains the number of quadruples where and and for which the sum is even.

Points

There are three groups of test sets, worth points in total.

1. For the first group of test sets, worth points, you may assume that .
2. For the second group of test sets, worth points, you may assume that .
3. For the third group of test set, worth points, there are no additional assumptions.