Problem 14 : Zeke battlefield

Statement

Zeke Yeager, the inheritor of the Beast Titan, has been in many fights, and his best ones prove that he is one of the most powerful beings on Attack on Titan.

Zeke is up to a big war against Erwin's army planning a defense line and how to determine the positions of his titans beforehand.

The battlefield is viewed as a matrix of cells ,each cell corresponds to a titan ,there is this two **major** types of titans that Zeke is using for the battle,**Giant** and **Mini**,giant titans can only move like chess castles which means if a giant titan takes a position in some cells of the matrix , then this titan defends all the cells in the same row and the same column.No two titans share a row or a column, Giant titans can only be positioned everywhere in the borders ,the number of giant titans are limited and can't be inside the sub-matrices,so Zeke needs to use other types of titans less powerful to defend inside the borders,the capacity of mini titans is the the space (sub-matrix) that they can move in as follows :

type 1 : 2x2 | type 2 : 3x3 | type 3 : 3x4 | type 4 : 4x4 | type 5 : 2x8

Help Zeke to position the mini titans in the right places to defend the inside spaces (sub-matrix) of the whole battlefield.

Input

The first line of input contains an integer N denoting the number of giant titans that Zeke already had putten.
The next N lines contain the position of each giant titans in the battlefield (line,column).

Output

Contains 6 lines:
1st row: number of titans type one.
2nd row: number of titans type two.
3rd row :titans number type three.
4th row: titans number type four.
5th row: titans number type five.
6th line :number of zones without any titans.

Example

Input	Output
3 1 1 8 8 5 5	1 1 0 0 0 2