# 4001   Square Painting

Given a 10000×10000-square in the Cartesian plane with 4 corners (0,0) (0,10000) (10000,10000) (10000,0). We consecutively draw N lines, which are numbered from 1 to N. These lines subdivide the given square into M pieces, of which all edges are longer than 1. Suppose that each line intersects exactly two edges of the given square and each line does not pass any square corner.

The i-th line divides the square into two parts: P_i containing (0,0), and Q_i not containing (0, 0). After all the subdivisions, each resulted piece is labeled by a nonnegative integer, which has binary representation $b_1 b_2 \ldots b_n$, where $b_i = 1$ if the piece lies in P_i, and $b_i = 0$ if the piece lies in Q_i. For example, the two lines in the figure subdivide the square into 4 pieces.

Now they want to paint all the pieces with S colors denoted by integers from 1 to S such that:

- Each piece is painted with only one color;

- Two adjacent pieces (having a common edge) must be painted with two different colors.

- The piece with the smallest label must be painted with color 1.

Your task is to write a program that determines the solution to paint the pieces with the minimum number of colors S.
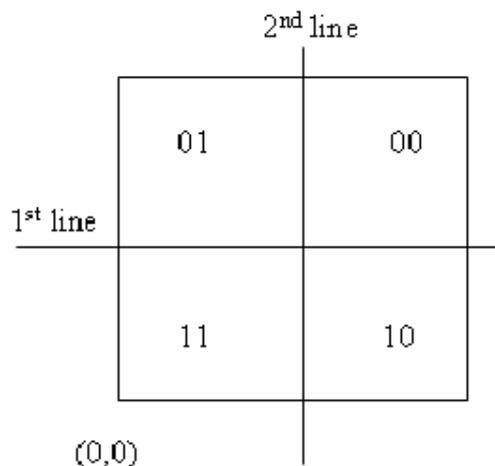
Input

The input consists of several data sets. The first line of the input file contains the number of data sets which is a positive integer and is not bigger than 20. The following lines describe the data sets.

For each data set, the first line contains a single positive integer N ($N \le 30$) — the number of lines. The i-th line of the following N lines contains 4 **integers** x_i, y_i, z_i, t_i — the coordinates of the intersections of i-th line with two square edges.

Output

For each test case, output the solution in a number of lines. In the first line, write the minimum number of colors S needed for painting. The next M lines described how each piece is painted in increasing order of the label of all the pieces. In each line, write two numbers separated by a space, the former is the label of the piece and the latter is the color used to paint that piece.

Sample Input

```
2
1
0 5000 10000 5000
2
0 5000 10000 5000
5000 0 5000 10000
```

Sample Output

```
2
0 1
1 2
2
0 1
1 2
2 2
3 1
```