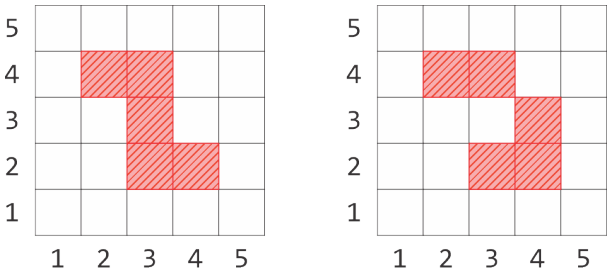


## Problem K – Kind Baker

Flora loves baking cakes, and for her company’s  $K$ -th birthday she promised to bring a special treat: a cake, with  $K$  different combinations of toppings to choose from! Unfortunately, she doesn’t have much time, so she needs to simplify things a bit.

A cake can be described as a  $100 \times 100$  grid of square cake pieces. A collection of pieces is connected if, for every pair of pieces in the collection, they are connected directly (they share a side) or indirectly (there is a sequence of pieces such that you can go from one piece to the other through directly connected pieces). The figure below depicts two collections of pieces (only a relevant part of the grid is shown). One collection is connected, while the other one is not.



(a) Connected (b) Not connected

Flora has a machine that accepts a connected collection of cake pieces and puts a certain topping on each of those pieces. A different topping is applied each time the machine runs. After using the machine a given number of times, each piece will have a (possibly empty) combination of toppings on it. Two pieces are considered to be of different types if they have a different combination of toppings. Flora wants to know the minimum number of times she has to use the machine to achieve exactly  $K$  different types of cake pieces, and a possible way to choose a connected collection of cake pieces for each time she will use the machine.

### Input

The input consists of a single line that contains an integer  $K$  ( $1 \leq K \leq 4000$ ) indicating the number of different types of pieces that the cake must have.

### Output

The first line must contain an integer  $T$  indicating the minimum number of times that Flora has to use the machine. Each of the next  $T$  lines describes a connected collection of cake pieces to drive into the machine the successive times that Flora will use it; the line must contain a positive integer  $N$  followed by  $N$  different pairs of integers  $X_1, Y_1, X_2, Y_2, \dots, X_N, Y_N$  ( $1 \leq X_i, Y_i \leq 100$  for  $i = 1, 2, \dots, N$ ), indicating that the collection consists of the pieces with coordinates  $(X_1, Y_1), (X_2, Y_2), \dots, (X_N, Y_N)$ . It is guaranteed that there exists at least one solution. The coordinates  $(1, 1)$  identify the square piece in any corner of the cake.

|                                |                                                                                |
|--------------------------------|--------------------------------------------------------------------------------|
| <b>Sample input 1</b><br><br>6 | <b>Sample output 1</b><br><br>3<br>2 2 3 3 3<br>3 3 2 3 3 4 3<br>3 3 3 4 3 4 4 |
| <b>Sample input 2</b><br><br>2 | <b>Sample output 2</b><br><br>1<br>3 100 99 99 99 99 100                       |

The picture below explains the first sample (only a relevant part of the grid is shown). To get exactly  $K = 6$  combinations of toppings, Flora has to use the machine a minimum of  $T = 3$  times. In the picture, the first topping applied by the machine is represented as a pineapple (★), the second as a cherry (■), and the third as a blueberry (●). The lists of pieces having each combination of toppings are as follows:

1. Only topping 1 (★): (2, 3);
2. Only topping 2 (■): (3, 2);
3. Only topping 3 (●): (4, 4);
4. Toppings 2 (■) and 3 (●): (4, 3);
5. All three toppings: (3, 3);
6. No toppings: rest of the pieces.

