

## 2051 Switch Toggling

Consider an  $n$  by  $n$  board of  $n^2$  squares. Each square has a pair of co-ordinates  $(x, y)$  where  $1 \leq x, y \leq n$ . Each square has two states: either “On” or “Off”. Initially, all squares are in the “Off” state.

For a square  $(i, j)$ , its *neighbors* are the squares:  $\{(i', j') \mid 1 \leq i', j' \leq n; |i' - i| + |j' - j| \leq 1\}$ . For example, if  $n = 4$ , the neighbors of  $(4, 2)$  are  $(4, 1), (4, 2), (3, 2), (4, 3)$ . Note that  $(i, j)$  is a neighbor of itself.

Define the operation  $toggle(i, j)$  that toggles the states of square  $(i, j)$ 's neighbors. That is, if a square's original state is “On”, it will be switched to “Off” and vice versa.

Write a program that, given an  $n$  by  $n$  board of all “Off” squares, computes a *shortest* sequence of  $toggle$  operations that turns all the squares “On”. If no sequences can turn all the squares “On”, output ‘No solution’.

### Input

Specifically, your program should read from standard input, that contains a few lines. Each line contains a number  $n$ .

### Output

Your program should output to standard output, which contains  $n$  sequences (or the string ‘No solution’), separated by blank lines. The  $i$ -th sequence gives a solution to the toggling problem of the board specified by the  $i$ -th input number  $n$ . Each sequence is a sequence of square co-ordinates of the form  $(a, b)$ . (Note that  $a$  and  $b$  are separated by a lone comma, not any spaces.) The co-ordinates of squares are separated by a space. A sequence specifies the order in which the  $toggle$  operation should be applied to the squares. For example, the sequence:

(1,2) (2,3) (1,1)

specifies that the toggle operations are applied to square  $(1, 2)$  first, then to square  $(2, 3)$ , and finally to square  $(1, 1)$ . Figure 3 shows how the above sequence changes the states of the squares in a 3 by 3 board. (Shaded squares are “On”.)

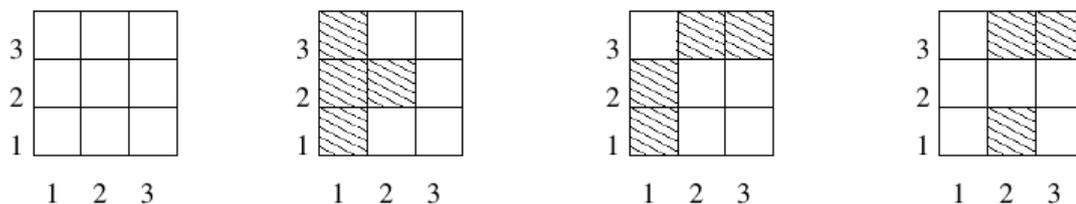


Figure 3: Boards

### Sample Input

2  
3  
4

**Sample Output**

(1,1) (1,2) (2,2) (2,1)

(2,2) (1,3) (3,3) (3,1) (1,1)

(1,3) (2,1) (3,4) (4,2)