Homework 1
CCC 2005 J2 NSA Numbers
https://cemc.uwaterloo.ca/contests/computing/2005/stage1/juniorEn.pdf

Problem Description
When a credit card number is sent through the Internet it must be protected so that other people cannot see it. Many web browsers use a protection based on "RSA Numbers."

A number is an RSA number if it has exactly four divisors. In other words, there are exactly four numbers that divide into it evenly. For example, 10 is an RSA number because it has exactly four divisors (1, 2, 5, 10). 12 is not an RSA number because it has too many divisors (1, 2, 3, 4, 6, 12). 11 is not an RSA number either. There is only one RSA number in the range 10...12.

Write a program that inputs a range of numbers and then counts how many numbers from that range are RSA numbers. You may assume that the numbers in the range are less than 1000.

Sample Session 1

Program Output: Enter lower limit of range
User Input: 10
Program Output: Enter upper limit of range
User Input: 12
Program Output: The number of RSA numbers between 10 and 12 is 1

Sample Session 2

Program Output: Enter lower limit of range
User Input: 11
Program Output: Enter upper limit of range
User Input: 15
Program Output: The number of RSA numbers between 11 and 15 is 2

Homework 2
CCC 2013 J3 From 1987 to 2013
https://cemc.uwaterloo.ca/contests/computing/2013/stage1/juniorEn.pdf

Problem Description
You might be surprised to know that 2013 is the first year since 1987 with distinct digits. The years 2014, 2015, 2016, 2017, 2018, 2019 each have distinct digits. 2012 does not have distinct digits, since the digit 2 is repeated. Given a year, what is the next year with distinct digits?

Input Specification
The input consists of one integer Y ($0 \leq Y \leq 10000$), representing the starting year.

Output Specification
The output will be the single integer D, which is the next year after Y with distinct digits.

Sample Input 1
1987

Output for Sample Input 1
2013

Sample Input 2
999

Output for Sample Input 2
1023

Problem J4/S2: Sunflowers

Problem Description
Barbara plants N different sunflowers, each with a unique height, ordered from smallest to largest, and records their heights for N consecutive days. Each day, all of her flowers grow taller than they were the day before.

She records each of these measurements in a table, with one row for each plant, with the first row recording the shortest sunflower's growth and the last row recording the tallest sunflower's growth. The leftmost column is the first measurement for each sunflower, and the rightmost column is the last measurement for each sunflower.

If a sunflower was smaller than another when initially planted, it remains smaller for every measurement.

Unfortunately, her children may have altered her measurements by rotating her table by a multiple of 90 degrees.

Your job is to help Barbara determine her original data.

Input Specification
The first line of input contains the number N ($2 \leq N \leq 100$). The next N lines each contain N positive integers, each of which is at most 10^9. It is guaranteed that the input grid represents a rotated version of Barbara's grid.

Output Specification
Output Barbara's original data, consisting of N lines, each of which contain N positive integers.

Sample Input 1
```
2
1 3
2 9
```

Output for Sample Input 1
```
1 3
2 9
```

Explanation of Output for Sample Input 1
The data has been rotated a multiple of 360 degrees, meaning that the input arrangement is the original arrangement.

Problem J3: Cold Compress

Problem Description

Your new cellphone plan charges you for every character you send from your phone. Since you tend to send sequences of symbols in your messages, you have come up with the following compression technique: for each symbol, write down the number of times it appears consecutively, followed by the symbol itself. This compression technique is called *run-length encoding*.

More formally, a block is a substring of identical symbols that is as long as possible. A block will be represented in compressed form as the length of the block followed by the symbol in that block. The encoding of a string is the representation of each block in the string in the order in which they appear in the string.

Given a sequence of characters, write a program to encode them in this format.

Input Specification

The first line of input contains the number N, which is the number of lines that follow. The next N lines will contain at least one and at most 80 characters, none of which are spaces.

Output Specification

Output will be N lines. Line i of the output will be the encoding of the line $i + 1$ of the input. The encoding of a line will be a sequence of pairs, separated by a space, where each pair is an integer (representing the number of times the character appears consecutively) followed by a space, followed by the character.

Sample Input

```
4
+++===!!!!
777777......TTTTTTTTTTT
(AABBC)
3.1415555
```

Output for Sample Input

```
3 + 3 = 4 !
6 7 6 . 12 T
1 ( 2 A 2 B 1 C 1 )
1 3 1 . 1 1 1 4 1 1 4 5
```

Explanation of Output for Sample Input

To see how the first message (on the second line of input) is encoded, notice that there are 3 + symbols, followed by 3 = symbols, followed by 4 ! symbols.