UIT-ACM Online Session

BACK TO SCHOOL !

August 24, 2016

Problems Overview

There are 8 (eight) problems in the packet, using letter A – H.

Problem A – Cipher

Problem B – Equation

Problem C – Four

Problem D – Palindrome 1

Problem E – Palindrome 2

Problem F – Pave

Problem G – Reverse

Problem H – Social

Remember: For all problems, read the input data from standard input and write the results to the standard output

Problem A

Cipher

Time limit: 1 second

The Caesar cipher is one of the earliest known and simplest ciphers. In Caesar cipher, each letter of the alphabet is shifted along some number of places. For example, with a shift of 1, 'A' would be replaced by 'B', 'B' would become 'C', and so on. The method is named after Julius Caesar, who apparently used it to communicate with his generals. Vigenère cipher is consisting of several Caesar ciphers in sequence with different shift values. For example, we have a plaintext to be encrypted is:

ATTACKATDAWN.

The person sending the message chooses a keyword and repeats it until it matches the length of the plaintext, for example, the keyword "LEMON":

LEMONLEMONLE

Each letter in the plaintext is shifted according to the corresponding letter in the keyword. So the first letter 'A' is shifted according to 'L', second letter 'T' is shifted according to 'E', the third letter 'T' is shifted according to 'M', and so on. The shifting itself works as follows. If we are shifting according to, say, 'L', then: 'A' becomes 'L', 'B' becomes 'M', 'C' becomes 'N', and so on. If we reach the end of the alphabet, then we wrap around to the beginning. So 'O' becomes 'Z', and 'P' becomes 'A'. If the keyword letter is 'E', then each letter is shifted by 4 (so 'T' becomes 'X' and so on). The plaintext above is encrypted to ciphertext:

LXFOPVEFRNHR

You are to write a program that encrypt a messages using Vigenère cipher.

Input

The first line in the test file contains a positive integer n (< 100), the number of test cases. The Following n lines contain one test case with two strings: the first string is the keyword, and the second string is the plaintext. Both the keyword and plaintext only contain capital letters (from A to Z).

Output

For each test case, output the encrypted ciphertext.

Sample Input	Sample Output
2 LEMON ATTACKATDAWN ABCD CRYPTOISSHORTFORCRYPTOGRAPHY	LXFOPVEFRNHR CSASTPKVSIQUTGQUCSASTPIUAQJB

Problem B

Equation

Time limit: 1 second

Given 4 positive integers A, B, C and K.

Find the minimum integer X that satisfy: $AX^2 + BX + C \geq K$

Input

The first line of input contains several test cases, the number of test cases. Each test case consists of 4 integers A, B, C $(1 \leq A, B, C \leq 10^5)$ and K $(1 \leq K \leq 10^{10})$.

Output

For each test case, output in one line the result of X.

Sample input	Sample output
3 4 5 5 3 4 5 6	0 1

Problem C

Four

Time limit: 1 second

The group of 4 integers A, B, C and D called THE_FOUR if $A + B + C + D = 0$.

Your task is find all THE_FOUR groups in a sequence of integers.

Input

The first line of input contains 1 positive number N ($1 \leq N \leq 2000$). The second line contains sequence $a_1, a_2, \dots, a_N$ separateed by a space ($10^{-6} \leq a_i \leq 10^6$).

Output

Print out the number of all THE_FOUR groups.

Sample input	Sample output
6 -4 3 1 0 -2 5	2

Problem D

Palindrome 1

Time limit: 1 second

A palindrome is a word, phrase, number, or other sequence of characters which reads the same backward or forward.

Your task is to figure out the character on whose removal it will make the string a palindrome.

Input

The input consists of several lines, each containing a text in form of lower case letters. Input terminal with line just contain '#' character.

Output

If it is possible to make a palindrome from the text, display the palindrome text deleting the earliest letter from the text. If it is not possible, display 'not possible'.

Sample input	Sample output
mamz uit dadz #	mam not possible dad

Problem E

Palindrome 2

Time limit: 1 second

A palindrome is a word, phrase, number, or other sequence of characters which reads the same backward or forward.

Given a positive integer N. Your task is to find out a smallest integer number that larger than N and is a palindrome.

Input

The input contains only positive number N has less than 10^6 digits.

Output

Print out the positive number match the requisition.

Sample input	Sample output
100	101
99	101

Problem F

Pave

Time limit: 1 second

How many smallest flagstones with size $n \times n$ needed to cover the $u \times v$ area without breaking the flagstone.

Input

The input contains three positive integer numbers u, v and n ($1 \leq u, v, n \leq 10^9$).

Output

The number of smallest flagstone needed.

Sample input	Sample output
2 1 2	1

Problem G

Reverse

Time limit: 1 second

Write a program that takes a string as input and returns the string with word reversed.

Input

The input contains a string only contain letters (from a to z and A to Z).

Output

Output the reversed input's string in reversed form.

Sample input	Sample output
abcd xyz	xyz abcd
University of Information Technology	Technology Information of University

Problem H

Social

Time limit: 1 second

In the era of social media, almost conversations are making through online. Scientists want to make a simple analysis by recording all the online messages between a group of user in one forum and find out what words are the used by every people in that group.

Input

The first line of input contains a single integer $N(1 \leq N \leq 10^4)$, the number of messages. The next N more lines, each consists of 2 strings: a user's name and the content of that user's message all in lower case.

(The length of each line not exceed 10^6 character)

Output

Print out all words using by every user, each on single line, ordered from most to least used and in case of a tie in alphabetical order. If not, print 'ALL CLEAR'.

Sample input	Sample output
4 A go to school B go home soon C if you are away from home D manage all your go services C be sure to stay alert for pokemon go	Go

This is end of the problems packet

Good Luck !