

## Homework 2

CCC 2019 J4 Flipper

<https://www.cemc.uwaterloo.ca/contests/computing/2019/stage%201/juniorEF.pdf>

### Problem Description

You are trying to pass the time while at the optometrist. You notice there is a grid of four numbers:

1	2
3	4

You see lots of mirrors and lenses at the optometrist, and wonder how flipping the grid horizontally or vertically would change the grid. Specifically, a “horizontal” flip (across the horizontal centre line) would take the original grid of four numbers and result in:

3	4
1	2

A “vertical” flip (across the vertical centre line) would take the original grid of four numbers and result in:

2	1
4	3

Your task is to determine the final orientation of the numbers in the grid after a sequence of horizontal and vertical flips.

### Input Specification

The input consists of one line, composed of a sequence of at least one and at most 1 000 000 characters. Each character is either H, representing a horizontal flip, or V, representing a vertical flip. For 8 of the 15 available marks, there will be at most 1 000 characters in the input.

### Output Specification

Output the final orientation of the four numbers. Specifically, each of the two lines of output will contain two integers, separated by one space.

#### Sample Input 1

HV

#### Output for Sample Input 1

4 3

2 1

#### Sample Input 2

VVHH

#### Output for Sample Input 2

1 2

3 4

Homework 2  
CCC 2011 J3 Sumac Sequences

<https://www.cemc.uwaterloo.ca/contests/computing/2011/stage1/juniorEn.pdf>

**Problem Description**

In a sumac sequence,  $t_1, t_2, \dots, t_m$ , each term is an integer greater than or equal 0. Also, each term, starting with the third, is the difference of the preceding two terms (that is,  $t_{n+2} = t_n - t_{n+1}$  for  $n \geq 1$ ). The sequence terminates at  $t_m$  if  $t_{m-1} < t_m$ . For example, if we have 120 and 71, then the sumac sequence generated is as follows: 120, 71, 49, 22, 27. This is a sumac sequence of length 5.

**Input Specification**

The input will be two positive numbers  $t_1$  and  $t_2$ , with  $0 < t_2 < t_1 < 10000$ .

**Output Specification**

The output will be the length of the sumac sequence given by the starting numbers  $t_1$  and  $t_2$ .

**Sample Input**

120  
71

**Output for Sample Input**

5

Note: Please use ArrayList and print the whole list out at last.

## Problem J4: Cyclic Shifts

### Problem Description

Thuc likes finding cyclic shifts of strings. A *cyclic shift* of a string is obtained by moving characters from the beginning of the string to the end of the string. We also consider a string to be a cyclic shift of itself. For example, the cyclic shifts of ABCDE are:

ABCDE, BCDEA, CDEAB, DEABC, and EABCD.

Given some text,  $T$ , and a string,  $S$ , determine if  $T$  contains a cyclic shift of  $S$ .

### Input Specification

The input will consist of exactly two lines containing only uppercase letters. The first line will be the text  $T$ , and the second line will be the string  $S$ . Each line will contain at most 1000 characters.

For 6 of the 15 available marks,  $S$  will be exactly 3 characters in length.

### Output Specification

Output `yes` if the text,  $T$ , contains a cyclic shift of the string,  $S$ . Otherwise, output `no`.

### Sample Input 1

```
ABCCDEABAA
ABCDE
```

### Output for Sample Input 1

```
yes
```

### Explanation of Output for Sample Input 1

CDEAB is a cyclic shift of ABCDE and it is contained in the text ABCC**CDEAB**AA.

### Sample Input 2

```
ABCDDEBCAB
ABA
```

### Output for Sample Input 2

```
no
```

### Explanation of Output for Sample Input 2

The cyclic shifts of ABA are ABA, BAA, and AAB. None of these shifts are contained in the text ABCDDEBCAB.

## Problem J3: Rövarspråket

### Problem Description

In Sweden, there is a simple child's game similar to Pig Latin called Rövarspråket (Robbers Language).

In the CCC version of Rövarspråket, every consonant is replaced by three letters, in the following order:

- the consonant itself;
- the vowel closest to the consonant in the alphabet (e.g., if the consonant is d, then the closest vowel is e), with the rule that if the consonant falls exactly between two vowels, then the vowel closer to the start of the alphabet will be chosen (e.g., if the consonant is c, then the closest vowel is a);
- the next consonant in the alphabet following the original consonant (e.g., if the consonant is d, then the next consonant is f) except if the original consonant is z, in which case the next consonant is z as well.

Vowels in the word remain the same. (Vowels are a, e, i, o, u and all other letters are consonants.)

Write a program that translates a word from English into Rövarspråket.

### Input Specification

The input consists of one word entirely composed of lower-case letters. There will be at least one letter and no more than 30 letters in this word.

### Output Specification

Output the word as it would be translated into Rövarspråket on one line.

### Sample Input 1

joy

### Output for Sample Input 1

jikoyuz

### Sample Input 2

ham

### Output for Sample Input 2

hijamon