2004 - 2005 **American Computer Science League** **Program #2**

All-Star Contest

Inverse Identity

Problem: Two properties that can exist in a mathematical system for a given operation are inverse and identity. They are defined below:

IDENTITY PROPERTY: There exists a unique element (x) in the set, such that for every element a: a @ x = a.

INVERSE PROPERTY: For every element (a) in the set, there exists a unique element (x) in the set such that : a @ x = the identity element.

The following are 2 different definitions of the operator @ on set A = {a,b,c} :

@	a	b	c
a	a	b	c
b	b	c	a
c	c	a	b

Table 1

@	a	b	c
a	a	a	a
b	a	b	c
c	a	c	b

Table 2

INPUT: There will be 5 lines of input. Each input line will contain 2 strings. The first string will give the elements of set A. For the above examples that string would be abc. The second string will give the table data with the data given across the rows. The string for table 1 above would be abcbcacab. The string for table 2 would be aaaabcacb.

OUTPUT: For each line of input print the identity element if it exists, otherwise print NONE. Also, for each line of input print the inverse for the last element of the string representing the set elements (in both examples above, that element is the c) if the inverse property exits for that system. If it does not exist print NONE. Each pair of outputs is worth 1 point. That is both answers must be correct to get the point. Label each answer as shown.

SAMPLE INPUT

1. abc, abcbcacab
2. abc, aaaabcacb

SAMPLE OUTPUT

1. IDENTITY = a
   INVERSE = b
2. IDENTITY = b
   INVERSE = NONE