### **SIENA COLLEGE**

**29th Annual** High School Programming Contest

##### **April 1, 2016**

###### Problem #5:  The 6561 Problem

Background Information:  A positive integer N may or not be able to be expressed with the digits 1, 2, 3, 4, 5, 6, 7, 8, and 9 in that order with addition (+) and subtraction (-) operators inserted between any two of the digits (but not before the 1). For example if N = 201 you can insert one addition operator between the 2 and 3, one subtraction operator between the 5 and 6 and a second subtraction operator between the 7 and 8 to form the expression 12 + 345 – 67 – 89 which is equal to 201. We say that 12+345-67-89 is a 1-to-9 expression for 201. Note that for this problem you may use between zero and eight addition/subtraction operators.

Some positive integers may have no 1-to-9 expressions and some have multiple 1-to-9 expressions. For example 160 has no 1-to-9 expression, 402 has only one 1-to-9 expression, and 9 has 22 different 1-to-9 expressions.

**Programming Problem:**

Input:  A positive integer N < 123456789.

Output: The input value N followed by the number of 1-to-9 expressions for N.

Example 1: Input:  160

 Output:  160

 0

Example 2: Input:  402

 Output:  402

 1

Example 3:  Input:  9

Output:  9

 22