

7 – 196 ALGORITHM

The 196-algorithm is a procedure for creating a palindromic integer: an integer that has the same value when examined forwards or backwards. Examples of palindromic integers are: 88, 121, 2332, 12321, etc. The 196-algorithm is as follows.

1. If the integer is a palindrome, then print that integer
2. Otherwise, take the integer and its reversal and add them together.
3. With the sum, repeat the process starting at step 1.

Here are some examples:

56: $56+65=121$! palindrome

57: $57+75=132$; $132+231=363$! palindrome

87: $87+78=165$; $165+561=726$; $726+627=1353$; $1353+3531=4884$! palindrome

89: 24 steps to the palindromic number 8813200023188

It is called the 196-algorithm because the integer 196 is the first number that, it appears, does not converge to a palindromic number. Such a number is called a Lychrel number (see <http://goo.gl/p3ATWp>). Though it hasn't been mathematically proven that 196 doesn't converge, it has been shown to not converge out to a number containing 300 million digits!

1. Prompt for two integers. These two integers constitute the range of integers (inclusive) of the integers that will be checked.
2. After the program runs, you will report the following statistics for the numbers examined in the given range:
 - a. The number of "natural" palindromes (numbers in the range that are already palindromes, such as 11, 121, 3553)
 - b. The number of non-Lychrel numbers (numbers which eventually yield a palindrome using the 196 algorithm)
 - c. The number of Lychrel numbers encountered. Assume a maximum of 60 iterations to indicate a Lychrel number
 - d. Because Lychrel numbers are rare, report each Lychrel number as it occurs.

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### ECO CS 18 ##
### Project 7 ##

Integer 1: 100
Integer 2: 300
196 is probably lychrel
295 is probably lychrel
Palindrome numbers = 20
Not Lychrel numbers = 179
Lychrel = 2
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