CSC111 Computer Science II

Lab 3 – Conditions & Loops

Introduction
The purpose of this lab is to write a program using the concepts you learned from the textbook chapters 1 - 6. Once you finish Lab3, you will have at least two files under Lab3 directory, lab3a.c and lab3b.c.

Getting started
Using your favorite editor, set-up the standard format of C.

/* CSC111 Computer Science II
   Lab 3 Conditions & Loops: lab3a.c
   Programmer: Your Name
   Professor: Dr. Lee
   File Created: Feb 2, 2017
   File Updated: Feb 2, 2017
*/

#include <stdio.h>
int main()
{
    return 0;
}

Problem to Solve: lab3a
You need to print out the result of adding numbers from 1 to N, \( \sum_{i=1}^{N} i \).

You are to calculate the sum two different ways:

1. Using for loop
   for (i = 1; i <=N; i++)
   {
       sum = sum + i;
   }

2. Using mathematical formula
   \( \text{sum} = \frac{N(N+1)}{2} \)

Your program should prompt for one integer (N) and output the result of both calculations.
Problem to Solve: lab3b

Revised The 3n + 1 Problem from Programming Challenges by Skiena and Revilla

Consider the following algorithm to generate a sequence of numbers. Start with a positive integer n. If n is even, divide by 2. If n is odd, multiply by 3 and add 1. Repeat this process with the new value of n, terminating when n = 1. For example, the following sequence of numbers will be generated for n = 22:

22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1

It is conjectured (but not yet proven) that this algorithm will terminate at n = 1 for every integer n. Still, the conjecture holds for all integers up to at least 1,000,000. For an input n, the cycle-length of n is the number of numbers generated up to and including the 1. In the example above, the cycle length of 22 is 16.

Your program should prompt for one integer (n) and output the sequence generated by this pattern until it reaches 1 and the cycle-length of n.