CS1620—Fall 2004
Assignment 4

Due: October 18, 2004 11:59 pm

Note: your programs will be graded on both correctness and style. Use comments when appropriate.

1. Write a program that reads in a number of integers, and displays the sum. Keep reading input until 0 is entered. Use a `do-while` loop.

   ```
   Enter a number (0 to stop): 10
   Enter a number (0 to stop): 2
   Enter a number (0 to stop): -5
   Enter a number (0 to stop): 7
   Enter a number (0 to stop): 0
   The sum is 14.
   ```

2. The "$3n + 1$" problem is a famous problem in mathematics and computer science. We start with any positive number n, and keep performing the following operations until $n = 1$:

   If n is even: replace n by $n/2$

   If n is odd: replace n by $3n + 1$

   It is conjectured that starting with any positive number n, this process always terminates (i.e. it reaches 1 eventually.)

   Write a program that reads in n and reports the number of steps it takes to reach 1. Keep reading input until the number entered is not positive.

```
Enter n (non-positive to stop):  5
Number of steps = 5
Enter n (non-positive to stop):  1
Number of steps = 0
Enter n (non-positive to stop):  2
Number of steps = 1
Enter n (non-positive to stop):  7
Number of steps = 16
Enter n (non-positive to stop):  0
```

3. Write a program that reads in a positive integer, and determines if the number is prime. Your program should keep asking for input until the user types in a number that is not positive.

   Note: a number n is prime if the only divisors of n are 1 and n.

   Hint: use the algorithm from assignment 1.

```
Enter a number (non-positive to stop):  100
100 is not prime.
Enter a number (non-positive to stop):  101
101 is prime.
Enter a number (non-positive to stop):  0
```