Indefinite Loop Worksheet

1. Compare and contrast the following pairs of terms:
   a. Definite loop vs. indefinite loop
   b. Interactive loop vs. Sentinel Loop

2. Give a truth table that shows the Boolean value of each of the following expressions:
   a. not (P and Q)
   b. (not P) and Q
   c. (not P) or (not Q)
   d. (P or R) and (Q or R)
3. Write a while loop fragment that calculates the following values:
   a. Sum of the first $n$ counting numbers: $1 + 2 + 3 + \ldots + n$
   
   b. Sum of a series of numbers entered by the user until the value 999 is entered. Note: 999 should not be part of the sum.

   c. The Syracuse (also called Collatz or Hailstone) sequence is generated by starting with a natural number and repeatedly applying the following functions until reaching 1:
4. A positive whole number \( n > 2 \) is prime if no number between 2 and \( \sqrt{n} \) (inclusive) evenly divides \( n \). Write a program that accepts a value of \( n \) as input and determines if the value is prime. If \( n \) is not prime, your program should quit as soon as it finds a value that evenly divides \( n \).

5. Modify the previous program to find every prime number less than or equal to \( n \).
6. Write a program that computes the fuel efficiency of a multi-leg journey. The program will first prompt for the starting odometer reading and then get information about a series of legs. For each leg, the user enters the current odometer reading and the amount of gas used (separated by a space). The user signals the end of the trip with a blank line. The program should print out the miles per gallon achieved on each leg and the total MPG for the trip.