ICS3U: Introduction to Computer Science **Repeating Code**

Conditional Repetition Using `while` Loops

1. Why does the following code never end? Correct the code so it behaves as expected.
   ```
   print("This program prints perfect squares until it hits 100.")
   n = 1
   while n**2 <= 100:
      print(n**2)
   ```
2. Why does the following code generate a run-time error? Correct the code so it behaves as expected.
   ```
   while name != "Bob":
      name = input("Please type the name Bob: ")
   print("Hello Bob!")
   ```
3. Rewrite the following piece of code, so that it uses a while loop instead of a for loop.
   ```
   for count in range(1,5):
      print(2*count)
   ```
4. Rewrite the following piece of code, so that it uses a for loop instead of a while loop.
   ```
   N = 15
   while N > 5:
      print(N)
      N -= 2
   ```
5. Write a program that repeatedly selects (and displays) a random letter from the alphabet, and stops once it has selected the letter A. When A has been selected, print a goodbye message.
6. Have the user enter any number of positive integers, and find the largest value entered. Your program should continue to read positive integers until a negative value is entered.
7. Write a loop that prints “hello” each time the user enters the letter A, B or C, and stops when the user enters any other letter.
8. Read positive integers from the user, until s/he enters one that is less than 20 or greater than 50. Stop the program with a goodbye message when this happens.
9. Given any positive integer, determine how many of its digits are even and how many are odd.
10. *Collatz Conjecture*: Beginning with a positive integer, divide it by 2 if it is even, or multiply it by 3 then add 1 if it is odd. The sequence of values produced by following these two rules are known as *hailstone numbers*. The Collatz Conjecture suggests that all such sequences will eventually reach a value of 1. For example, the number 3 generates the sequence 3, 10, 5, 16, 8, 4, 2, 1. Write a program to test if this is true. Of the first ten natural numbers, what is the value that has the longest sequence? Can you find an integer that does *not* reach 1?