

## Lab Exercise #2

### Assignment Overview

This lab exercise provides practice with selection (*if*) and repetition (*for*, *while*) in Python.

The *if* statement is used to choose between alternatives. The *for* and *while* statements are used to repeatedly execute blocks of statements.

The *for* statement is most useful when you know exactly how many times you want to repeatedly do something (for example, you know how many sides of a polygon you want to draw). Here is an example showing how to print something *n* times:

```
n = 4
for i in range(n):
    print("Hi!")
```

Here is the corresponding output:

```
Hi!
Hi!
Hi!
Hi!
```

The *while* statement is most useful when you don't know in advance how many times the program will be required to repeat a task (for example, prompting the user to enter a value until correct input is provided). Here we will use *while* to repeat a fixed number of times simply to practice using the statement. To compare and contrast with the previous example, we will print something *n* times:

```
n = 4
count = 0
while count < n:
    print("Hi!")
    count = count + 1
```

Here is the corresponding output:

```
Hi!
Hi!
Hi!
Hi!
```

In this example, note that you must manage the counter variable ("count") yourself. If you make a mistake with the counter management, the loop may end up repeating forever. In that case, in the upper right of the shell window is an icon with two choices, "Interrupt Kernel" and "Restart Kernel". Try "Interrupt Kernel" first and if that doesn't work, "Restart Kernel" will.

## Programming with Control Structures

Develop a Python program which inputs a series of integers and processes them. The program will:

- a) Continue to process values until the user enters the value 0
- b) Ignore all negative integers
- c) Count the number of odd integers entered
- d) Count the number of even integers entered
- e) Calculate the sum of the odd integers in the series
- f) Calculate the sum of the even integers in the series
- g) Display the sum of odds
- h) Display the sum of evens
- i) Display the count of odds
- j) Display the count of evens
- k) Display the total number of positive integers entered
- l) Optional: print a message whenever a negative integer is entered

Sample output:

```
Input an integer (0 terminates): 1
Input an integer (0 terminates): 3
Input an integer (0 terminates): -2
Input an integer (0 terminates): 2
Input an integer (0 terminates): 6
Input an integer (0 terminates): 5
Input an integer (0 terminates): 0

sum of odds: 9
sum of evens: 8
odd count: 3
even count: 2
total positive int count: 5
>>>
```

## Commentary

- a) A nice characteristic of this problem is that it can be developed in small pieces. Remember: always try to break a problem into smaller pieces that are easier to solve.
- b) First write a program that prompts for an integer, displays the integer, and stops asking for more integers when 0 is entered. Use **while**. Under what condition do you continue to loop? Here is a suggested outline:

```
prompt for an integer # (and convert the string to an int)
while some_Boolean_condition:
    # do something
    prompt for another integer
```

- c) Once that simple program is tested and working, add in another piece such as (c) to count the number of odd integers entered. Create a variable with an appropriate name, such as `odd_count`, and assign it an initial value of 0 (before the while loop). When an odd number is entered, add one to `odd_count` (for example, `odd_count += 1`). Display the count.
- d) Next: count the number of even integers and display the count.
- e) Next: calculate the sum of the odd integers. The approach is similar to counting: choose a variable name, initialize it to 0; when the integer is odd, add the integer to the variable. Display the sum.
- f) Next: calculate the sum of the even integers and display the sum.
- g) Finally, ignore all negative numbers which the user inputs. One approach: *if* the integer is positive, do all the counting and summing, *else* do nothing (that is, you can use an *if* statement without an *else* clause).
- h) If you have time, try this: print a message if the integer is negative.