Python Activity 3 (MA11): Looping Structures: FOR Loops

"Another form of loops"

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Learning Objectives

Students will be able to:

Content:

- Explain the difference between **while loop** and a **FOR loop**
- Explain the syntax of a **FOR loop**
- Explain how to use the **range()** function in a **FOR loop**
- Explain an **accumulator** in a **FOR loop**

Process:

- Write code that includes **FOR loop**
- Write code that uses use **FOR loops** within functions

Prior Knowledge

- Python concepts from L1-1 through L8-1
- Understanding of flowchart input symbols

Further Reading

- L8-2: http://nbviewer.jupyter.org/github/gsprint23/cpts111/blob/master/lessons/L8-2.ipynb

Critical Thinking Questions:

1. Enter and execute the following two Python programs.

WHILE LOOP -- Python Program

```
name = input("Enter your name: ")
x = 0
while(x < 20):
    print(name)
    x = x+ 1
```

FOR LOOP – Python Program

```
name = input("Enter your name: ")
for x in range(20):
    print(name)
```

a. What is the output for each program?

b. Both programs produce the same output. Which code fragment is more concise?

FYI: The Python predefined **range()** function is used to define a series of numbers and can be used in a FOR loop to determine the number of times the loop is executed..

2. Enter and execute the following code fragments and state the output:

a.
```
for x in range(5):
   print(x, end=" ")
```
_____

b.
```
for x in range(1,5):
   print(x, end=" ")
```
_____

c.
```
for x in range(3,20,2):
   print(x, end=" ")
```
_____

d.
```
numIterations = 6
for x in range(numIterations):
   print(x, end=" ")
```
_____

e.
```
numIterations = 6
for x in range(1, numIterations+1):
   print(x, end=" ")
```
_____

3. After examining the five code fragments in #2, explain how the **range()** function works. Include an explanation of the arguments.

_____

_____

_____

_____

4. Enter and execute the following code.

```
i = 3
while i <= 18:
    print(i, end=" ")
    i += 3
```

a. Rewrite this code using a FOR loop and the **range()** function.

b. Why would you use a FOR loop over using a WHILE loop?

_____

_____

_____

5. Read through the code and determine what it does.

```
favorite = input("Enter your favorite ice cream flavor: ")
for x in range(1,5):
   print(str(x) + ".", favorite)
```

a. Explain what you think the program does (without executing the code).

_____

_____

_____

_____

b. Enter and execute the code to determine if you were correct. What does the program actually do? Provide a detailed explanation.

_____

_____

_____

_____

_____

c. Explain the use of the **str()** function in the print statement. Why is it needed?

_____

_____

_____

_____

6. Complete the arguments in the following range function so that the code prints the even numbers between 100 and 200 inclusive.

```
for x in range(_____):
   print(x)
```

7. Complete the arguments in the following range function so that the code prints: 5 4 3 2 1 0.

```
for x in range(_____):
   print(x)
```

FYI: An **accumulator** is a variable that stores the sum of a group of values.

8. Examine the following code segment.

```
total = 0
for x in range(5):
   number = int(input("Enter a number: "))
   total += number
print("The total is:",total)
```

a. What is the **accumulator** variable in the code segment?

_____

b. Why is the variable **total** initialized to 0 in the first line of code?

_____

_____

c. How many numbers does the program prompt for? _____

d. Explain what the following code does: **`total += number`**

_____

_____

9. Is it better to use a **FOR loop** when you know the number of times the loop should be executed or when you do not know? Explain your answer.

_____

_____

_____

Application Questions: Use the Python Interpreter to check your work

10. Re-write our WHILE loop code from Monday (L8-1) to print the first 20 even numbers using a FOR loop. Example output:

```
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
```

11. Write a code segment using a FOR loop that prints multiples of 5 from 5 to 500 inclusive.

12. Write code to prompt the user for the number of stars to print. Using a FOR loop, print that many stars all on one line. Example:

```
Please enter the number of stars to print: 5
*****
```

13. Re-solve problems 11 and 12 using a WHILE loop instead of a FOR loop. Compare the two implementations.