CSE 1321L: Programming and Problem Solving I Lab

Lab 6

Flow Control (Part 3)

What students will learn:

Using WHILE loops.
Using FOR loops.
Using NESTED FOR loops.

Content

Overview
Lab6A: Multiplication and Exponentiation Calculator
Lab6B: Guess the Number
Lab6C: Pyramid Pattern Printing

In a **WHILE** loop, the <condition> can be anything (variable or expression) that resolves to a **Boolean** value (**True** or **False**). This could mean **Boolean** variables, as well as **comparison** or **logical expressions**.

In a **FOR** loop, the <iterable> can be anything that can be iterated over (we will see more about these at a later module. Right now, the only things that you can iterate over are **strings** and **ranges**). At each iteration of the loop, <element> will hold one element from the <iterable>. These elements are retrieved one by one, in the order that they appear in the <iterable>.

It is important to know **when** to use them. Here is an overall guideline to help you out:

Use a **FOR** loop when you want to repeat something **a certain number of times**. For example:

The total amount of iterations that would have been performed by the end of this nested loop would have been 15, since a single iteration of the outer loop φőIJŔŰŰIJIũŸŸƓƓIJIʼnŸI ů IJ Ĭ ǯƻIJÑőIJ ů ŸIIJ loops we nest, we are going to exponentially increase the number of total iterations.

In this example:

```
            for x in range(3):
                  for y in range(5):
                        …
                  for y in range(3):
                        …
```

The total amount of iteration would be 24, since we only have “2” levels of nesting, a single iteration of the outer loop would be composed of 8 iterations of the inner loop.

ƚƽŔφőƓIIJƻŔŸƨƚƽIJIJťƚŖċũũũċĤƚƚőŸƨũĬőċƻIJφőIJċƓƓIŸƓIŔċφIJǯũIJŰċ ů IJƚa

Lab6A.py
Lab6B.py
Lab6C.py

Lastly, make sure you review the sample output and make sure the output of your program follows the exact same format including the input statements, print statement7(v)12.6(v)111.4 (t)1011. (p)∀

```
4^(3) = 64

Multiplication and Exponent Calculator
Choose option 1 for Multiplication
Choose option 2 for Exponentiation
Choose option 3 to Exit
10

Invalid Choice

Multiplication and Exponent Calculator
Choose option 1 for Multiplication
Choose option 2 for Exponentiation
Choose option 3 to Exit
3

Closing the Calculator...
```

Lab6B: Guess the Number

This program challenges users to guess a randomly generated number. The user will have to guess a number from 1 to 100 and the program should inform the user whether their guess is too low or too high or if they guessed the correct number.

Instead of hardcoding a number, we will use a Random Number Generator (RNG) to generate a random number. ÑőIJÅ] ĲŊIJŰIJIċqIJŀĲċĲIċŰĬŸůĲŰƨůĤIJIĲƽRqőRŰĲċĲŀƓIJĦRǯIJĬĲIċŰŊIJЯĲRŰĲqőRŀĲĦċŀIJĲ between 1 and 100.

This is how you can use an RNG in python:

1. First you need to import the **random** library (this import statement should be at the top of your code):

(5(es)1ee08(es)-11he)8Td[(a)-7.8(e))f (5(es4-11he)8Td( )Tj/TT2 1 Tf04[(2)T.7 ( )10-D]9 T9(12D01)10-D911h1 c0CDBDC /T[c0CDBDC /T)7.R[(c)

```
Enter any number between 1 and 100: 25
Too high!
Enter any number between 1 and 100: 12
Too high!
Enter any number between 1 and 100: 6
Too low!
Enter any number between 1 and 100: 9
Too low!
Enter any number between 1 and 100: 10
Correct! I was thinking of 10
```

Sample Output #2:

Lab6C: Pyramid Pattern Printing

Write a program that prompts the user for a positive integer and prints a pyramid pattern with numbers. The program should prompt the user to enter a positive number or to enter 0 to terminate the program. The input value will be used to determine the number of rows and the numbers inside those rows.

Requirements:

The pyramid pattern printing must be implemented using a **nested FOR loop**.

Assume that the user will only enter any positive number and 0.

After successfully printing the pyramid pattern, the program should re-prompt the user to enter another value or 0 to terminate.

The row input will determine the number of rows for the pyramid and will also determine the content for each row.

•

Submission Instructions:

Programs must follow the output format provided. This includes each blank line, colons (:), and other symbols.