CSE 1321L: Programming and Problem Solving I Lab

Lab 4

Flow Control (Part 1)

What students will learn:

* Logic using selection structures (if/else and match statements)
* Logic using repetition structures (for loops)
* Review of I/O (input and output)
* Review of reading input from the user and storing it into variables
* Review of doing basic calculations with variables to generate a solution

Overview: In this lab, you’ll be going over *IF* statements, *MATCH* statements, and *WHILE* loops. This lab is all about logic, so you’ll need to think through the problem. As with previous weeks, all labs should have the appropriate class names and file names, Lab4A.py, Lab4B.py, Lab4C.py.

**Lab4A: What is my grade?**

First, we are going to start with a very simple question to understand the use-case of conditional statements. Imagine someone just got an exam grade back and was wondering what letter grade they would get. You should write a program that will prompt the user to input the number grade they received on their exam and returns the letter grade they will get for that numerical grade that was entered. Fractional numerical values (90.5 is an acceptable input) should also be accounted for: a grade of 0.5 is rounded up. Use the below table as a reference to determine which numerical grades correspond to which letter grades:



Sample runs are shown below. The user input is in bold.

Sample run #1:

Enter the score of your exam: **96**

Letter grade is: A

Sample run #2:

Enter the score of your exam: **97.5**

Letter grade is: A+

Sample run #3:

Enter the score of your exam: **42**

Letter grade is: F

**Lab4B: Creating a menu**

For this lab exercise you are going to create a basic program which will allow the user to make a selection from a menu; selecting a different option from the menu should result in a different outcome. For this lab, please use a **match statement** for all possible options the user may input.

First, welcome the user with the welcome message as shown below, explaining what the program does and what the user is expected to do. Next, have the user input a number; based on the number entered, one of the various transformations must be performed. If the user chooses to exit the program, display “Thank you, goodbye!”. If the user attempts to input a number that is not on the menu, display “Invalid option!”. Finally, if the user tries to display the reciprocal of 0, display “Cannot divide by 0!”.

Hints:

* Additive inverse of 5 is -5
* Reciprocal of 3 is 1/3

Sample run #1:  
Welcome!  
Please input a number: **100**  
  
What would you like to do to this number:  
0) Get the additive inverse of the number  
1) Get the reciprocal of the number  
2) Square the number  
3) Cube the number  
4) Exit the program  
**0**  
  
The additive inverse of 100.0 is -100.0

Sample run #2:  
Welcome!  
Please input a number: **50**  
  
What would you like to do to this number:  
0) Get the additive inverse of the number  
1) Get the reciprocal of the number  
2) Square the number  
3) Cube the number  
4) Exit the program  
**1**  
  
The reciprocal of 50.0 is 0.02  
  
Sample run #3:  
Welcome!  
Please input a number: **500**  
  
What would you like to do to this number:  
0) Get the additive inverse of the number  
1) Get the reciprocal of the number  
2) Square the number  
3) Cube the number  
4) Exit the program  
**2**  
  
The square of 500.0 is 250000.0  
  
Sample run #4:  
Welcome!  
Please input a number: **9**  
  
What would you like to do to this number:  
0) Get the additive inverse of the number  
1) Get the reciprocal of the number  
2) Square the number  
3) Cube the number  
4) Exit the program  
**3**  
  
The cube of 9.0 is 729.0  
  
Sample run #5:  
Welcome!  
Please input a number: **100**  
What would you like to do to this number:  
0) Get the additive inverse of the number  
1) Get the reciprocal of the number  
2) Square the number  
3) Cube the number  
4) Exit the program  
**4**  
  
Thank you, goodbye!  
  
Sample run #6:  
Welcome!  
Please input a number: **100**  
What would you like to do to this number:  
0) Get the additive inverse of the number  
1) Get the reciprocal of the number  
2) Square the number  
3) Cube the number  
4) Exit the program  
**100**  
  
Invalid option!  
  
Sample run #7:  
Welcome!  
Please input a number: **0**  
What would you like to do to this number:  
0) Get the additive inverse of the number  
1) Get the reciprocal of the number  
2) Square the number  
3) Cube the number  
4) Exit the program  
**1**  
  
Cannot divide by 0!

**Lab4C: Cha-Ching**

For this lab, use a **while loop**.

A **sentinel loop** is a loop that continues to process data until it reaches a specific value(s) that signals that it should stop looping; this special value(s) is usually indicated as the condition of the while loop. A very common application for this is allowing a user to rerun a program.

Write a very simple program that mimics a bank account. The program should start the user out with $1000. It should print out a welcome message **once**, followed by the options present for the user. The program should allow the user to make a deposit, withdrawal, and see their current balance. Every time the user deposits or withdraws, the program should show the user their new balance; it should also ask the user if they want to return to the main menu. **As long as the user types ‘Y’ or ‘y’, the program should keep running.**

The user input is indicated in **bold**.

Sample output:  
Welcome!  
You have $1000 in your account.  
  
Menu  
0 – Make a deposit  
1 – Make a withdrawal  
2 – Display account value  
  
Please make a selection: **1**How much would you like to withdraw?: **50**Your current balance is $950  
Would you like to return to the main menu (Y/N)? : **Y**  
Menu  
0 – Make a deposit  
1 – Make a withdrawal  
2 – Display account value  
  
Please make a selection: **0**How much would you like to deposit?: **100**Your current balance is $1050  
Would you like to return to the main menu (Y/N)?: **Y**  
Menu  
0 – Make a deposit  
1 – Make a withdrawal  
2 – Display account value  
  
Please make a selection: **500**Invalid entry, please try again.  
Would you like to return to the main menu (Y/N)?: **Y**Menu  
0 – Make a deposit  
1 – Make a withdrawal  
2 – Display account value  
  
Please make a selection: **1**How much would you like to withdraw?: **5000**Not enough balance. Withdrawal cancelled.Your current balance is $950  
Would you like to return to the main menu (Y/N)?: **Y**  
Menu  
0 – Make a deposit  
1 – Make a withdrawal  
2 – Display account value  
  
Please make a selection: **2**  
Your current balance is $1050  
Would you like to return to the main menu (Y/N)?: **N**  
Thank you for banking with us!