CSC 110 – Lab 2
Writing Algorithms using Python

Names: _____

Introduction

The purpose of this lab is to develop some simple algorithms and implement them in Python. You will use control structures and manipulate lists. You will also practice storing your Python algorithms as modules that can be imported into the interpreter.

Pair Programming

As you know, you will be working in pairs each week in the lab. The purpose of this is to help you learn how to work in a team on a programming project. There are many software engineering techniques that encourage team programming, and we will be implementing one of these techniques this semester.

Pair programming is a technique in which two programmers work together on a single computer to solve a programming problem. The partners take turns being the person at the computer (the driver) and the person watching and helping (the observer). It is the job of the driver to enter the code that the partners agree on. It is the job of the observer to consider the strategic direction of the work, and to suggest modifications and improvements to the driver. The key to this technique is that the partners switch positions periodically.

In the lab each week, you will start each program by working together on an algorithmic solution. You can write this down in pseudocode, or you can discuss it and agree verbally. This is the most important part of the exercises you will do because it represents your solution to the problem.

Once you have agreed on an overall strategy for your solution, you will decide who will start out as the driver. Then, every 10 minutes, your instructor will indicate that it is time to switch roles. You will change places and the observer will become the driver, and vice versa. You will continue this process until your program is complete.

Exercises

For the exercises that follow, you will create a new file using the Python editor and save it under a name that represents what the algorithm does. Be sure that you save

your programs with a .py extension so that it is recognized as a Python module. Be sure to comment your code well so that your instructor can see your solution plan.

1) Write an program that computes the value of a^b using repeated multiplication. That is, given integers *a* and *b*, compute *a* raised to the *b* power without using the ** operator.

   Hint: This is similar to the multiplication example we looked at in class.

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2) Write a program that will determine how many of a set of 10 numbers are even and how many are odd.
   a. Read in one number at a time.
   b. Compute and display the number of even integers and the number of odd integers.

   Hint: You can use the modulus operator (%) to determine if each integer is even or odd.

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Challenge Problems

You must complete Problems 1 & 2 and have the TA or instructor approve them before proceeding to Problems 3 & 4.

3) Write an algorithm that inputs the x and y values for two points, and computes the distance between the points. You may need to remind yourself of the formula for the distance between two points (Google can help).

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4) Write an algorithm to create a Guess the Number game:
   - The program should get a random number and then ask the user to guess the number and see how many guesses it takes.
   - Each time the user guesses, the program should tell the user if the number is correct, or if it is higher than the user's guess, or lower than the user's guess.
   - Have the program loop until the user guesses correctly.

- Print the number to guesses the user took to get the right number.
- **Hint:** Start with the code from the lecture video for this week (find it on the sample code page of the Sakai web site).

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