CS 2316
Individual Homework 1 – Python Practice
Due: Thursday, May 23rd, before 11:55 PM
Out of 100 points

Files to submit: **1. HW1.py**

For Help:
- TA Helpdesk – Schedule posted on class website.
- Email TA's or use T-Square Forums

Notes:
← **Don't forget to include the required comments and collaboration statement (as outlined on the course syllabus).**
← **Do not wait until the last minute** to do this assignment in case you run into problems.

Learning Objectives Associated With This Homework:
- Variable Assignment
- Simple Expressions
- Calling Functions
- Defining Functions
- Printing and String Formatting

Part 1 – Simple Functions

You will write a few python functions for practice with the language. In part 1, all functions will use the **INPUT** function to get input data from the user and the **PRINT** function to display output to the user. All of the functions from part 1 and part 2 will appear in the same file, HW1.py. In your HW1.py file, also include a comment at the top with your name, section, GTID/Email, and your collaboration statement. After the comment, write each of the following functions. You must name each function exactly as specified in this document, and your input and output must exactly match the given examples.

1. WindowsToLinux
2. coneSurfaceArea
3. changeMaker
4. caloriesBurned

Function Name: **WindowsToLinux**
Parameters:
    None
Return Value:

None

Description:

1. Write a user-interactive function to convert Windows to Linux. The conversion equation is as follows: 1 Windows is 90 Macs, while 1 Linux is 9200 Macs.

2. Get the number of Windows from the user; make sure to use a descriptive prompt so the user knows what to enter (e.g. "Enter number of Window Machines"). You may assume that the user will enter a valid float (e.g. 34.4) and do not have to do error checking.

3. Convert the number entered by the user to Linux Machines using the conversion information above.

4. Print the calculated number of Linux Machines (including fractional Linux's); be sure to add a label to the display value so the user knows what the value means (e.g. display "35 Linux's" instead of just 35)

5. Error Check: 500 Window's should be 4.891304347826087 Linux's.

Function Name: **coneSurfaceArea**

Parameters:
    None
Return Value:
    None
Description:

Write a user-interactive function to calculate the volume of a cone.

1. Get the slant height and radius of the circle at the base of the cone, and the unit of measurement of the cone from the user; make sure to use a descriptive prompt so the user knows what to enter. Your prompt for the slant height should include the word "height", your prompt for the radius should include the word "radius" and your prompt for the unit(s) of measurement should include the word "unit".

2. Calculate the surface area of the cone using the following formula: SurfaceArea = pi * radius^2 + pi * radius * slantHeight.

3. Print the calculated surface area with 3 digits after the decimal place; be sure to add a label to display value so the user knows what the value means with the units entered by the user (e.g. display "Surface Area of the cone is 35.322 units-squared" instead of just 35.322, where "units" would be replaced with whatever unit of measurement the user entered).

Function Name: **changeMaker**

Parameters:
    None
Return Value:
    None
Description:

Write a user-interactive function that will tell the user the coins needed to make a given

amount of money with the least coins used. For example, let's say we're trying to make 45 cents worth of change using quarters, dimes, nickels and pennies using the least number of coins possible. The solution would be to use the largest denomination of coin possible at each step to solve the problem, so we would first use a quarter, leaving 20 cents. Then, we would use a dime, leaving 10 cents. Then, we would use another dime leaving 0 cents and making a total of 45 cents. In this example, we created 45 cents using 3 coins, which is the optimum solution for the problem.

You should prompt the user for a **number of cents**, so 102 would be 1 dollar and 2 cents.

1. Get the amount of cents as an integer from the user; make sure to use a descriptive prompt so the user knows what to enter.
2. Compute the number of quarters, dimes, nickels, and pennies that could make up the cents the user entered. You should compute each of these numbers in the above order using the following information:
   - Quarters are worth 25 cents
   - Dimes are worth 10 cents
   - Nickels are worth 5 cents
   - Pennies are worth 1 cent
   - The modulo (a.k.a. remainder) operator in python is % and will show the remainder left after an integer division. It IS useful for this problem!

3. Print the calculated number of of quarters, dimes, nickels, and pennies on **one line;** be sure to add appropriate labels to the display values so the user knows what the value means (e.g. display "3 quarters, 1 dimes, 1 nickels, 0 pennies").

Function Name: **caloriesBurned**
Parameters:
     None
Return Value:
     None
Description:
Write a user-interactive program to calculate the amount of calories burned while running.

1. Ask for the person's weight in pounds; make sure to use a descriptive prompt so the user knows what to enter.
2. Ask for the distance run in miles; make sure to use a descriptive prompt so the user knows what to enter.
3. Calculate the calories burned using the information they provided and the formula below (you will need to convert the formula into a legal python equation):

   Calories burned is the weight of the person times the distance they ran times a constant of 0.653.

4. Print the result. The value must be formatted (both the wording and the number of decimal places) EXACTLY as follows: "Your calories burned is 24.9." *You may have to use string formatting to remove extra decimal places from your*

calculation.

Part 2 – Complex Functions

Now you will write a few python functions that take in input as **PARAMETERS** and **RETURN** output data for practice with the language. These functions should also be put into the HW1.py file.

Function Name: **calcDistance**

Parameters:
1. x1 – a number representing the x coordinate of the first point as an integer
2. y1– a number representing the y coordinate of the first point as an integer
3. x2 – a number representing the x coordinate of the second point as an integer
4. y2 – a number representing the y coordinate of the second point as an integer

Return Value:
      A floating point number representing the distance between the two points.

Test Cases:
1. calcDistance(5,10,15,20) --> 14.142135623730951
2. calcDistance(-1,15,7, -3) --> 19.697715603592208

Description:
Write a function calcDistance that will calculate and return the distance between the two given points as a floating point number. Use the distance formula given below:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Note that to successfully complete this problem, you will need to take the square root. To do this, you must import the math module using "import math" before you use the square root function, which is named sqrt. You can call functions from modules you import by saying modulename.functionname(params) instead of just saying functionname(params).

Function Name: **makeBLT**

Parameters:
1. bacon - an integer representing the number of bacon strips
2. lettuce - an integer representing the number of lettuce leaves
3. tomatoes - an integer representing the number of tomato slices

Return Value:
      An integer representing the number of BLT sandwiches you can make given the inputted stock of ingredients.

Test Cases:
1. makeBLT(150, 20, 40) --> 6
2. makeBLT(1, 5, 51) --> 0

3. makeBLT(11, 3, 200) --> 1

Description:
Write a function that returns the number of BLT sandwiches you can make based on the number of bacon strips, lettuce leaves, and tomato slices specified as inputs. Assume that it takes the following to make 1 sandwich:

- 10 bacon strips
- 3 lettuce leaves
- 6 tomato slices

Note that the number of sandwiches must be a whole number; you cannot have 1 1/2 of a sandwich. For example, if you have 12 bacon slices, 20 lettuce leaves, and 5000 tomato slices, you can only make 1 sandwich (despite the fact that you have enough lettuce and tomato to make 6 sandwiches).

Hint: Python has a built-in function called min that takes in a comma separate list of numbers and returns the minimum value. E.g. min(5, 3, 7) returns the number 3. This may be useful in coming up with your solution.
You can solve this problem without using conditionals!

Part 3 – Turtles

The final part of the homework involves importing the turtle module and create a simple picture of a skyline. This code will also be put into HW1.py file.

Function Name: **drawSkyline**
Parameters:
None
Return Value:
    None

Description:
Write a function that uses the turtle module to create a window and draw a skyline in the window. Your skyline must have at least ten buildings, with at least three different styles of building. You may create helper functions that you call to assist you with drawing the various buildings. You may use a for or while loop to draw the buildings, but the buildings can not be all the same height. You may add extra features such as windows, atmospheric effects, etc. When your turtles are finished drawing, you should use the **exitonclick()** method to display the window until the TA clicks on it.

Grading Breakdown

Simple Function

WindowsToLinux	**5**
coneSurfaceArea	**10**
changeMaker	**20**
caloriesBurned	**15**

Complex Functions

calcDistance	**15**
makeBLT	**20**

Turtles

drawSkyline	**15**

If your function works, but prints a value when it is supposed to return it, or returns it when you are supposed to print it, the TA will **deduct half of the points** for that function.