Assignment 1
(100 points)

RULES GOVERNING ACADEMIC INTEGRITY ARE STRICTLY OBSERVED WITHOUT EXCEPTION. THIS IS AN INDIVIDUAL ASSIGNMENT

Purpose:

To allow you to exercise with a logical thinking process to formulate very simple algorithms, leading the way to the implementation of this logic in some programming language like Python. The logic will include simple inputs and outputs, looping, using counters, and conditional statements (if and else). This is an individual assignment.

Question:

Write a **separate** Python program for each of the following that will allow you to:

a. Input three numbers from the user, compute their sum and output the sum to the screen. For example, to input a value from the keyboard to a variable x, you can use:

    x = input ("Please input a number: ")

    Don't forget to convert x to a number like we did in class.

b. The objective is for you to print all the numbers divisible by a number ***n*** in the range [***start*** , ***end***]. You are to ask the user to input through from the keyboard integer numbers (+ and – signs are accepted before the number):

    a. A variable ***start*** to indicate the start of the range.
    b. A variable ***end*** to indicate the end of the range, and
    c. A variable ***n*** to indicate the number to check divisibility for.

    For example, if the user inputs 1000 for start, 3500 for end, and 5, your program will print all the numbers divisible by 5 in [1000,3500]. You must validate that start, end, n are valid integers.

c. Input a salary, and compute and output a basic tax on the salary as such:
    a. If the salary is in [0-50000[, the tax is 15 percent.
    b. If the salary greater than or equal to 50000, the tax is 25 percent.
d. Input two numbers from the user, swap the two numbers (using a third memory location), and output the numbers to the screen after swapping.
e. Input two numbers from the user, and print the number that has the higher value to the screen.
f. Input a GPA of a student in the range [0,4]. If the GPA is in:
    a. [3-4] you say "Superb!"
    b. [2-3[you say "Good!"
    c. [1-2[you say "Hmm!"

d. [0-1[you say “No comment!”

g. Input a number from the user and check whether the sum of the digits of the number is divisible by 7. You need to let the user know using an output message.
h. Input a phone number from the user in the form: (XXX)XXX-XXXX. If the number is not in this form, you need to give the user an error message, and ask them to try again (only once). Once the user inputs a valid number, you need to extract and print to the screen the area code.
i. Ask the user to input from the keyboard a string composed of the characters ***a***, ***b***, or ***c***. Your input is case sensitive (a’s are different than A’s as an example). However, the user may decide to input a string with invalid characters. Your program will output to the screen the number of a’s in the string, the number of b’s, the number of c’s, as well as the number of all other invalid characters (non a, b, or c). This means that you will not prohibit the user from inputting a string composed of other characters also.
j. Input five numbers from the keyboard, compute and print their standard deviation. The standard deviation is given as:

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2}$$

To compute the standard deviation, you are to:

i. Compute the average of the five numbers.
ii. Subtract the average from each number, then square the result, call this quantity the square of the difference.
iii. Sum up all of the square of the differences.
iv. Divide the square of the differences by 5.
v. Compute the square root of the value in (iv).
vi. Print the result.

You will be grades as follows for each problem (10 points each):

- 6 points for the correctness of the logic.
- 1 points for using proper messages in your program.
- 1 point for documentation (inserting proper comments).
- 2 points for a professional judgment of your overall solution.