CISC106 – Lab 01

For this lab you will need to submit a report containing the answers for all the questions. Type your responses (no scanning or photographing is allowed) and submit it together with the Python file (.py) you are going to generate for the last question. Please do not forget to add your name at the top of all the submitted files.

1) **Contrary to popular belief, computer science is really incredibly creative. It is a matter of taking the tools you have and solving the problem you are given (or are interested in solving). In essence, it is puzzle solving. Along those lines, here are four puzzles, along with your accompanying tools. (30 points):**

   a. Following the tips provided, find out the color of each house and the nationality of the person who lives on each one of them (10 points)

- The Spanish lives on the right of the red house
- The German lives in the blue house.
- The Italian lives in an even-numbered house.

	House 1	House 2	House 3
Color			
Nationality			

   b. Five women are at a beauty salon waiting to be attended. Following the tips, find out their names, profession, the service they are looking for, the color of their bags, the state of their hometown and what is their favorite juice flavor (20 points).

- The woman who is going to color her hair is on the exact left of Claudette.
- The lady in the middle is going to relax her hair.
- The one who is going to cut her hair is somewhere in between the girl from FL and the one who has a red bag, who is on the right.
- The one who is going to have make-up is sitting on the first chair.
- The lady from PA is sitting on the exact left of the Publicist.
- Mary is a programmer.
- The dentist is sitting on the fourth chair.
- The chef is sitting side-by-side with the lady from Massachusetts.
- Anna is on the exact right of the woman who is having a make-up.
- Tania is sitting in one of the ends.
- The lady from PA loves lemonade.
- The lady who has a red bag is sitting somewhere on the left of the one who drinks strawberry juice.
- The person who drinks Orange juice is sitting on the second chair.
- The owner of the green bag is sitting side-by-side with the one who likes grape-flavored juice.
- The lady from MA is sitting on the exact right of the lady who has a White bag.
- The woman from Georgia loves strawberry juice.

- The lawyer is sitting side-by-side with the woman who is going to cut her hair.
- The owner of the yellow bag is sitting on the exact left of the owner of the White bag.

	Chair1	Chair2	Chair3	Chair4	Chair5
Bag color					
State					
Favorite juice					
Name					
Profession					
Service					

2) Multiples of 3 and 5 (20 points)

If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23.

Describe all the steps you would take in order to find the sum of all the multiples of 3 or 5 below 1000. Use a list of instructions (using natural language, not a programming language) that you would need to perform in order to achieve this task.

3) Area of a rectangle: (10 points)

Write an algorithm (again using natural language) that asks for the width and height of a rectangle, calculates its area and provides the result.

4) Given the following algorithm: (10 points)

```
begin
        read a, b, c
        if (a < b+c) and (b <a+c) and (c <a+b) then
                if (a=b) and (b=c) then
                        print 'This is an equilateral triangle.'
                else
                        if (a=b) or (b=c) or (a=c) then
                                print 'This is an isosceles triangle'
                        else
                                print 'This is an scalene triangle'
                        end if
                end if
        else
                print 'It is not possible to form a triangle.'
        End if
end
```

Which message is printed when the variables a, b and c assume the following values?

a = 1, b = 2, c = 3:

a = 3, b = 4, c = 5:

a = 2, b = 2, c = 4:

a = 4, b = 4, c = 4:

a = 5, b = 3, c = 3:

5) Comparing expression: (9 points)

Do the pairs of instructions below produce the same results?

(4/2)+(2/4) and 4/2+2/4

4/(2+2)/4 and 4/2+2/4

(4+2)*2-4 and 4+2*2-4

6) **Using Python as a calculator and saving your work in a Python script**: **(21 points)**

In the Python Shell window, type in the number 8, then hit the Enter key. Python gives you back the number 8. This is an example of an atomic expression. We can also write compound expressions, which consist of two expressions (either atomic or compound), with an operator between them and optionally surrounded by parenthesis.

Here are some examples, each conforming to the definition of "expression" by repeatedly applying the two definitions given above. Type each expression into the Python Shell window and make sure you understand the results returned by Python.

8

5

(8 + 5)

((8 + 5) - 3)

(((8 + 5) - 3) * 2)

(In the third expression, the operator is +, and the two arguments required by the +operator are two numbers, 8 and 5.)

It certainly would waste a lot of time if we had to re-type a series of expressions if we wanted to recompute our calculation with one changed value. Fortunately we are able to create files that contain Python code and execute them using the Python interpreter.

Create a new Python script by choosing File->New Window from the menu. Copy and paste all the expressions from question 4 and the final expression from this question into the editor window. Then choose File->Save As... and save it as lab1.py. Run the script by choosing Run->Run Module. What do you notice that is different from the previous example? Submit your lab1.py file through Sakai