

# CSI2100-01 Lab 4

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# Overview

- Questions
- Programming Problems
- Deliverables, due-date and submission
- **Notes:**
  - 1) Please consider using the [OnlinePythonTutor](#) when debugging your code.
  - 2) Because of our coronavirus precautions, you are provided with an excerpt of the relevant sections of the textbook together with this lab assignment.

# Questions

You are kindly asked to submit the answers to the questions on the following page in a file named **README.txt**. See the Lab 3 assignment on how to create this file with PyCharm.

- **Question 1:** Exercise 17 from p. 75 of the textbook  
Example 1:  $2+3*4 \rightarrow (2+(3*4))$   
Example 2: see Lecture 2 ("Data and Expressions"), page 76.
- **Question 2:** Exercise 19 from p. 76 of the textbook
  - You may **re-write** the expressions by attaching **indices** to the operators. You can then refer to the **indexed operators** in your answer.
  - **Example:**  
 $\text{var1} * \text{var2} * \text{var3} - \text{var4} \rightarrow \text{var1} *(\mathbf{1}) \text{var2} *(\mathbf{2}) \text{var3} -(\mathbf{3}) \text{var4}$   
"Operator associativity is used to resolve ambiguity between operators  $*(\mathbf{1})$  and ...".
  - The above method is only a suggestion. You may use any method that disambiguates between operators. For example, you can write " ...the **1st** multiplication operator ...".
- **Question 3:** Textbook p. 118, Exercise 5.
- **Question 4:** Textbook p. 118, Exercise 7.
- **Question 5:** Exercise 6 from p. 74 of the textbook.
- **Question 6:** Exercise 7 from p. 74 of the textbook. (The period '.' after today is part of the string to print.)
- **Question 7:** Exercise 12 from p. 75 of the textbook.

# Programming Problems

You do not have to concern faulty user input for any programming problem except Problem 5!

**Problem 1:** In a country, residents are subject to the following income tax:

Income	Amount of tax	
Not over \$750	1% of income	
\$751 - \$2,250	\$7.50	plus 2% of amount over \$750
\$2,251 - \$3,750	\$37.50	plus 3% of amount over \$2,250
\$3,751 - \$5,250	\$82.50	plus 4% of amount over \$3,750
\$5,251 - \$7,000	\$142.50	plus 5% of amount over \$5,250
Over \$7,000	\$230.00	plus 6% of amount over \$7,000

Write a program that asks the user to enter the amount of taxable income (as an **integer**), then displays the tax due. Please use 2 digits precision after the fractional point for your output. (You may assume that the user enters positive numbers only.)

**Example:** Enter the taxable income in USD: 7100  
Tax due: 236.00 USD

**Hint:** please refer to Slide 22 of Lecture 3 (If-Elif-Else example) on how to structure your code for this problem.

**Problem 2:** Textbook page 120, Exercise P4. You can assume that the user enters only **positive** integers, or 0, which terminates the program.

**Example:**

```
Your number: 5
Your number: 15
Your number: 105
Your number: 0
Sum: 20
```

**Hints:**

1. The user may repeatedly enter numbers, so you must use a loop to solve this problem.
2. Boolean flags are convenient to control loop execution. Please refer to the code on Slide 57 (Lecture 3) for an example.
3. You **may** consider the following (incomplete) skeleton code as a starting point:

```
Stop = False
Sum = 0

while Stop == False:
    # Read number, update Sum if number in range
    # Update Stop-flag if number is 0
# Output sum
```

**Problem 3:** Write a program that calculates the number of digits an integer contains (assume that the user will enter positive integers only):

Example 1:           Enter a number: 12345  
                          The number 12345 contains 5 digits

**Note:** please use singular instead of plural (“digit” instead of “digits”) if the number contains only one digit (only in this case 😊).

Example 2:           Enter a number: 5  
                          The number 5 contains 1 digit

**Hint:** you are required to use a loop with a series of // division operations with this example.

*Continued on the following page...*

**Problem 4:** Textbook page 120, Exercise P6. Please use a field-width of 3 characters per number (and no extra blank between numbers, which means that 99 is immediately followed by 100, like this: '99100'). Please print all numbers right-justified.

**Problem 5:** Textbook page 121, Problem M1. Assume that the user always enters an integer literal for the temperature. The program should re-prompt the user for any invalid temperatures until the user enters a valid temperature.

Example:

```
This program will convert temperatures (Fahrenheit/Celsius)
Enter (F) to convert Fahrenheit to Celsius
Enter (C) to convert Celsius to Fahrenheit
Enter selection: C
Enter temperature to convert: -280
Enter temperature to convert: -300
Enter temperature to convert: -400
Enter temperature to convert: 22
22 degrees Celsius equals 71.6 degrees Fahrenheit
```

**invalid on the  
Celsius scale**

**Note:** the source-code for the program from Figure 3-19 is provided on YSCEC.

# Marking Criteria and Plagiarism

- Marking Criteria
  - Score is only given to programs that compile and produce the correct output with Python version 3.
  - Points are deducted for programs that are named wrongly. See the list of deliverables for the required file names.
  - Points are deducted for programs that produce warnings.
  - Points deductions on programming style: please provide comments in your code.
  - Please pay particular attention to the requested output format of your programs. Deviating from the requested output format results in points deductions.
- Plagiarism (Cheating)
  - This is an individual assignment. All submissions are checked for plagiarism.
  - Once detected, measures will be taken for **all** students involved in the plagiarism incident (including the ``source" of the plagiarized code).



# Deliverables

- Please prepare the files for the programming problems and questions. The names of the files, their YSCEC due-dates and the archive file-name is given in the below table.

Problem	File name	Due	Archive name
1	lab4_p1.py	Wednesday April 15 23:00	lab4_<student id>.zip
2	lab4_p2.py		
3	lab4_p3.py		
4	lab4_p4.py		
5	lab4_p5.py		
Questions	README.txt		