Lab 3 Introduction to PASS, and Exercises on Operators and Basic I/O

1. **P**rogramming **A**ssignment a**S**sessment **S**ystem [**PASS**]
In this course, you will use the **PASS** system for program testing and assignment submission.

You may access **PASS** via the link in Canvas, or directly via https://pass3.cs.cityu.edu.hk
(You'll be using your CityU EID)

Select our course – **CS2311_CA1(2021 Sem.A) - Computer Programming**

Click the link "**Problem list**".   Problem list

Click the "**Test/Submit**" icon for the question you want to solve.

You may specify source code (**.cpp** file) upload with the "**Browse**" button *(default)*, or you may paste the source code into the space provided. *(Need to select from radio button)*

To test the program *(tutorial or assignment)*, click the **Test** button.   Test

> *Note: Your program should follow the input and output format EXACTLY*
> *(i.e. identical spacing, new lines and letter case).*
> *Otherwise the PASS system will say that your program's output is incorrect.*

To submit for **assessment**, click the **Submit** button. *(Only available for assignments, it does not exist for lab questions.)* Please be reminded that only the submissions via the **Submit** button are counted for grading. The code in **Test** will NOT be considered for grading.

> *Note: After submission, PASS will report the output of your program versus the "expected output". Note that for assignments, the test cases for "Test" may not be the same as what we use for grading. (Test cases for "Test", which you can see when you click the Test button, are usually a subset of the complete test cases we use for grading.)*

2. **Exercises on Operators and Basic I/O**
NOTE: In all the following exercises, the input entered by the user is highlighted by underline. It is not part of the output from the program.

Q-1.

a) Write a program **Area.cpp** that the user inputs the width and height of a rectangle. The program computes and output the area of the rectangle.
    Hint: Use the following formula to compute the area:

    ### Area = Width * Height

b) Enhance the program so that the input and output of the program are as follows.
    (Note: The underlined words are user input. You don't need to print it)

    Expected Output:
    ```
    Please enter the width
    3
    Please enter the height
    5
    The area is 3*5=15
    ```
    You should test your program on **PASS**.

c) Improve the programming style of the program. This includes using:
    i)   More meaningful variable name to reflect the purpose of the variable;
    ii) Indentation (use the tab character to indent and shift-tab to move back by 1 level);
    iii) Comments.

Q-2.

a) Write a program **ConvertTemperature.cpp** that read a temperature in Celsius (data type: int) and display it in Fahrenheit (data type: double). Round the result to 2 decimal places.
Hint: Use the following formula to convert Celsius to Fahrenheit:

$$Fahrenheit = 9 / 5 * Celsius + 32$$

Expected Output:
```
Enter Temperature in Centigrade:
30
Temperature in Fahrenheit is:
86.00
```

b) Extend the program of **part-a** and convert calculated Fahrenheit (data type: double) into Kelvin (data type: double). Round the result to 2 decimal places.
Hint: Use the following formula to convert Fahrenheit to Kelvin:

$$Kelvin = (Fahrenheit + 459.67) * 5 / 9$$

Expected Output:
```
Enter Temperature in Centigrade:
30
Temperature in Fahrenheit is:
86.00
Temperature in Kelvin is:
303.15
```
You should test your program on **PASS**.

Q-3. [part a) will be marked]

a) Write a program **SumOfDigits.cpp** that read a number of three digits and print the sum of digits.
Hint-1: For example, a number N = 346 the output should be 3+4+6 = 13
Hint-2: Use % and / operators.

Expected Output:
```
Please Enter a number of Three Digits:
456
Sum of Digits is:
15
```

b) Extend the program of **part-a)**, that reads a number of three digits and prints the sum of square of digits.
*Hint: For example, a number N = 123 the output should be 1*1 + 2*2 + 3*3 = 14*

Expected Output:
```
Please Enter a number of Three Digits:
456
Sum of Square of Digits is:
77
```
You should test your program on **PASS**.

Q-4.

Write a program **TimeDiff.cpp** to compute the time difference between the start time and end time (in days, hours, minutes and seconds). The console prompt for data entry and the output display should strictly follow the format of the Expected Output shown below. For simplicity and without loss of generality, let us assume the start time and end time are both within a month of 31 days. Also assume that the end time is always greater than the start time. The program does not have to cope with singulars and plurals in the output (just use "(s)").

Expected Output:

```
For start time, please enter the following information:
Enter the start day (a number in range from 1 to 31): 1
Enter the start hour (a number in range from 0 to 23): 0
Enter the start minute (a number in range from 0 to 59): 0
Enter the start second (a number in range from 0 to 59): 0
For end time, please also enter the similar information:
Enter the end day (a number in range from 1 to 31): 2
Enter the end hour (a number in range from 0 to 23): 3
Enter the end minute (a number in range from 0 to 59): 4
Enter the end second (a number in range from 0 to 59): 5

The time difference is: 1 day(s), 3 hour(s), 4 minute(s), and 5 second(s).
```

Hint: Consider using the modulo operator %.

You should test your program on **PASS**.