Langara College

# Department of Computing Science & Information Systems

# CPSC1160 – Algorithms and Data Structures I

###### **Lab1: C++ Review**

**Problems [30 marks]**

**Instructions:**

1. Create a new folder named **Lab1**.
2. Inside folder **Lab1,** create a new folder for each problem.
3. Use SciTE or any other IDE to create and run your programs.
4. If you use SciTE, but it does not compile your programs, then download **scitestart.zip** from D2L, unzip it to your desktop and run **scitestart.bat** to start SciTE again.

**Problem 1: [10 marks] Calculate a person’s BMI and show the status**

(filename: **CheckBMI.cpp**)

The Body Mass Index (BMI) is often used by scientists and physicians to determine whether a person is underweight or overweight. The formula for calculating BMI is:

bmi = weight / height2

Write a program that gets a person’s weight (kg) and height (m) from the keyboard and then calculates and displays the person’s BMI with two digits after the decimal. If the person’s BMI is below 20, display “You are underweight”, else if it is above 25, display “You are overweight”, else display “Your BMI is normal”.

**Problem 2: [10 marks] Check password** (filename: **CheckPassword.cpp**)

Some websites impose certain rules for passwords. Suppose the password rules are as follows:

* A password must have at least eight characters.
* A password must consist of only letters and digits.
* A password must contain at least two digits.

Write a function that checks if a password is valid. In the main function, prompt the user to enter a password, call the function, and display valid password if the rules are followed or invalid password otherwise.

**Problem 3: [10 marks] Count numbers above average**

(filename: **CountNumbersAboveAve.cpp**)

Write a program that randomly generates 10 whole numbers between 0 and 100, calculates the average and then counts how many are above the average. The randomly generated numbers are first saved into an output file (**You are not allowed to use an array**) and the average is calculated, and then the numbers are read back from the file one by one and the counting above the average is performed. The count is displayed at the end. For example, if the 10 random numbers are

44 61 98 45 45 17 63 24 9 95

the average is 50.10 (keep two digits after the decimal) and there are 4 numbers above the average.

**When and what to hand in**

By the end of the lab time, demo **Problem 1** to the instructor.

By 11:59pm, Monday, September 17, 2018, zip the other problems and submit them to BrightSpace.

**Appendix:**

**Installing MinGW’s C++ Compiler and SciTE to a Home Computer**

If you plan to do programming work on your home computers, you can download and install MinGW’s C++ compiler and SciTE to your home computers.

1. **Installing MinGW’s C++ compiler**
   1. Go to the following website

<http://sourceforge.net/projects/mingw/files/>

**to download minGW**

* 1. Save the file to your computer and run it.
  2. Be sure to install MinGW to C:\MinGW
  3. When prompted, be sure to choose C++ compiler.

1. **Set the path so that you can use the C++ compiler g++ from SciTE**

In order to set the path, you need to edit your Environment Variables. The steps shown below is for Windows 8 and should be taken carefully. If in doubt, ask for help.

* 1. Right-click **This PC**, then **Properties**.
  2. In the **System Properties** window, click the Advanced system settings.
  3. Click the **Environment Variables…** button.
  4. In the Environment Variables dialog box, go to the top section called User variables.
  5. If you already have a variable called **PATH**, select the line for PATH and then click the **Edit** button. Next go to the end of the field of Variable value, type “;”, then copy and paste the following path:

C:\MinGW\bin

* 1. If you do not have a PATH variable, then click the **New** button, Type PATH in the Variable name field, and copy and paste the path given above to the **Variable value** field. Click OK.
  2. Click OK to close the Environment Variables dialog box.
  3. Click OK to close the System Properties window.

1. **Download and install SciTE**
   1. Go to the following location to download SciTE

<http://scintilla.sourceforge.net/SciTEDownload.html>

* 1. Click the link **full download** under the section Windows Executables. Save the file to your computer .
  2. Double-click the downloaded file. On the window shown, click the button **Extract** to extract the zip file. Make sure you extract the files to C:\Program files.
  3. Go to C:\Program files\wscite. You should see the file **SciTE.exe**. Double-click it to open SciTE.
  4. From SciTE, open a program or create a new C++ program, compile, and run it.