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 no**scitestart.bat** to start SciTt compile your programs, then download **scitestart.zip** from D2L, unzip it to your desktop and run E 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 Canadian postal code** (filename: **CheckPostalCode.cpp**)

Write a program that prompts the user to enter a Canadian postal code in the format of ldl dld, where d is a digit and l is a letter. Here are some sample runs:

Enter a postal code: V4E 6P8

V4E 6P8 is a valid postal code

Enter a postal code: V4e 6P8

V4e 6P8 is a valid postal code

Enter a postal code: V45 6P8

V45 6P8 is an invalid postal code

**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 and then the numbers are read back one by one with the counting being performed and the count being 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, Thursday, September 14, 2017, zip the other problems and submit them to D2L.

**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.