LANGARA COLLEGE

DEPARTMENT OF COMPUTING SCIENCE AND INFORMATION SYSTEMS

CPSC 1160 - ALGORITHMS AND DATA STRUCTURES I

Assignment 01 – Lab 01

September 14, 2017

Instructions

- This assignment is worth 10 points, and is due on September 21 at 04:00 PM.
- Coding quality (e.g. indentation, documentation, naming considerations for variables, functions, constants, etc.) is also marked as extra point up to 10% (1 point).
- All the source code files (*.cpp* files) are required to be put in a folder named **Lab01**; the whole folder then should be submitted as a single zipped file on D2L.
- Read the *Lab Guideline* for more information.

Fibonacci Sequence

In mathematics, the Fibonacci numbers are the numbers in the following integer sequence, called the Fibonacci sequence, and characterized by the fact that every number after the first two is the sum of the two preceding ones[1]:

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 …

By definition, the first two numbers in the Fibonacci sequence are 0 and 1, and each subsequent number is the sum of the previous two.

The sequence F_n of Fibonacci numbers is defined by the recurrence relation:

$$F_n = F_{n-1} + F_{n-2} \text{ where } F_0 = 0 \text{ and } F_1 = 1$$

Problem 1 [3 points]

Write a program with the following capabilities:

1. Generating the Fibonacci number F_n (only one number).
2. Generating F_0 to F_n of the Fibonacci sequence.
3. Generating F_m to F_n of the Fibonacci sequence, where $m \leq n$.

Name your source code file as Fibo1.

Notes:

- Your program should provide the user with the above options, and only the requested option is need to be printed out on the console.
- Parameters m and n are determined by the user.
- In your program, make sure about the validity of the user input.

[1] Refer to https://en.wikipedia.org/wiki/Fibonacci_number

Problem 2 [7 points]

Write three functions each for one of the capabilities mentioned in Problem 1: a function for calculating the Fibonacci number F_n, another one for printing F_0 to F_n of the Fibonacci sequence on the console, and finally a function that prints any desired range of the Fibonacci sequence on the console.
Then, rewrite your program for Problem 1 to call these functions appropriately to do the same job as desired in Problem 1.
Name your source code file as Fibo2.