Lab #9: Introduction to Programming

Sum & Average Calculator

(Partner Lab)

Goal

To learn how to create an algorithm and convert it to C++ code.

Instructions

After watching the lecture videos (and completing the associated exercises), complete the 2 following problems. For this program you will engage in pair programming. Please refer to the partner rules for the class.

Part 1 *(20 points)*

Create a new project (or copy and paste the better of you and your partner's eclipse lab). Type in the following code segment (this is the same one discussed in class). Make sure you type the code EXACTLY as it appears here except lines with ➔.

```
/*******************************************************************************
 * AUTHOR      : Michele Rousseau
 * STUDENT ID  : 123456
 * LAB #8      : Introduction to Programming
 * CLASS       : CS1A
 * SECTION     : MW: 8am
 * DUE DATE    : 12/20/26
 ******************************************************************************/
#include <iostream>
#include <iomanip>
using namespace std;

 /*******************************************************************************
  * INTRO TO PROGRAMMING
  *------------------------------------------------------------------------------
  * This program will read in two values and output the sum.
  *------------------------------------------------------------------------------
  * INPUT:
  *     firstNum   - First value to be summed.
  *     secondNum  - Second value to be summed.
  *
  * OUTPUT:
  *    sum - The sum of the two values input.
  ******************************************************************************/

 int main()
 {
     /*******************************************************************************
      * CONSTANTS
      * -----------------------------------------------------------------------------
      * OUTPUT - USED FOR CLASS HEADING
      * -----------------------------------------------------------------------------
      * PROGRAMMER : Programmer's Name
      * CLASS      : Student's Course
      * SECTION    : Class Days and Times
      * LAB_NUM    : Lab Number (specific to this lab)
      * LAB_NAME   : Title of the Lab
      ******************************************************************************/
```

CHANGE THIS SECTION

```
const char PROGRAMMER[] = "Michele Rousseau";
const char CLASS[]      = "CS1A";
const char SECTION[]    = "MW: 7:30a - 12:00p";
const int  LAB_NUM      = 9;
const char LAB_NAME[]   = "Intro to Programming";

int  firstNum;    //  IN, CALC & OUT - first value to sum
int  secondNum;   //  IN, CALC & OUT - second value to sum
int  sum;         //  CALC     & OUT - sum of 2 integers input

/*****************************************************************
 * OUTPUT - Class Heading
 *****************************************************************/
cout << left;
cout << "*************************************************\n";
cout << "*  PROGRAMMED BY : "  << PROGRAMMER << endl;
cout << "*  "      << setw(14) << "CLASS"    << ": " << CLASS    << endl;
cout << "*  "      << setw(14) << "SECTION"  << ": " << SECTION  << endl;
cout << "*  LAB #" << setw(9)  << LAB_NUM    << ": " << LAB_NAME << endl;
cout << "*************************************************\n\n";
cout << right;


/*****************************************************************
 * INPUT - reads in two inputs from the user (firstNum & secondNum)
 *****************************************************************/
cout << "Enter the first integer:  ";
cin  >> firstNum;

cout << "Enter the second integer:  ";
cin  >> secondNum;

/*****************************************************************
 * PROCESSING - Calculates the sum of the two inputs
 *****************************************************************/

sum  =  firstNum  +  secondNum;

/*****************************************************************
 * OUTPUT -  the input and the sum in the following format:
 *                    firstNum + secondNum = sum
 *
 *   For example, if firstNum = 32 & secondNum = 41 output will be:
 *
 *       32 + 41 = 73
 *****************************************************************/

cout << endl;
cout << firstNum
     << " + " << secondNum
     << " = " << sum
     << endl;

return 0;
}
```

CHANGE THIS

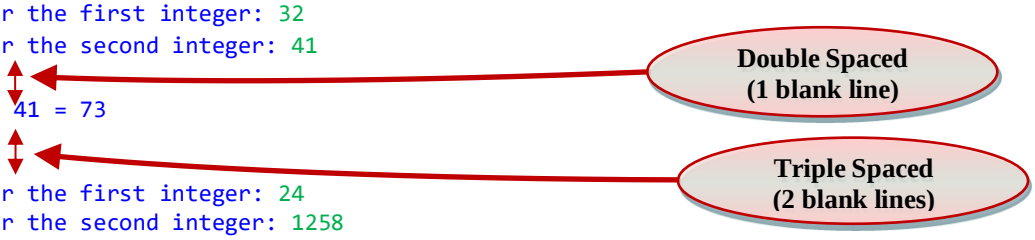
Run the code provided 3 times to produce the following output (it should look exactly as follows → note: there is a space between the numbers and the operators.

EXPECTED INPUT (in green) / OUTPUT (in blue) ➔ for PART 1

Your Input/Output should look exactly like this (but not in color and with your information).
Run the code 3 times – The first time cut and paste the class heading and the output into your text file (screenio.txt). For the second two runs cut and paste everything except the class heading. Triple space between each run.

Be sure to have your class heading print out with cout statements in your code and include line numbers.

```
1.*************************************************
2.*  PROGRAMMED BY : Michele Rousseau
3.*  CLASS         : CS1A
4.*  SECTION       : MW: 7:30a - 12:00p
5.*  LAB #8        : Intro to Programming
6.*************************************************
7.
8.Enter the first integer: 32
9.Enter the second integer: 41
10.
11.32 + 41 = 73
12.
13.
14.Enter the first integer: 24
15.Enter the second integer: 1258
16.
17.24 + 1258 = 1282
18.
19.
20.Enter the first integer: 34
21.Enter the second integer: 563
22.
23.34 + 563 = 597
```



Part 2 *(70 points)*

Create a **new project** (or copy and paste your part 1 of this lab). You will modify the HIPO chart, pseudocode and code such that it also calculates the average the two numbers.
First, discuss the HIPO chart (including the input, output and processing variables necessary) and the pseudocode. Now you will **switch "seats"** with your partner. Whoever was watching before will now be typing the source code and the other will be checking for errors.

a. Write the HIPO Chart (using excel)
b. Write the pseudocode (typed)
c. Rewrite the code

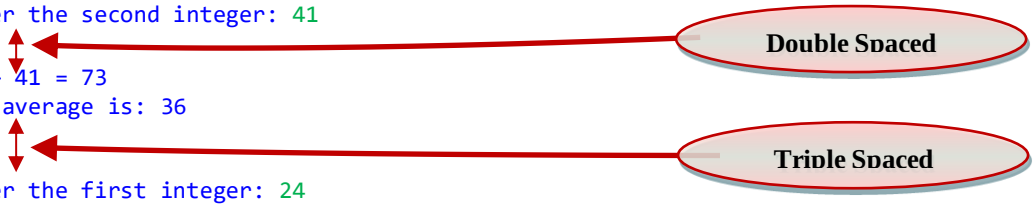
TO FORMAT THE FLOATING POINT NUMBER PROPERLY, USE THE FOLLOWING LINE:
cout << fixed << setprecision(2); // this line must come before the cout for average

Make sure when you divide to get the average DO NOT DIVIDE BY 2 → you must divide by 2.0

EXPECTED INPUT (in green) / OUTPUT (in blue) → for PART 1

Your Input/Output should look exactly like this (but not in color)

```
24.************************************************
25.*  PROGRAMMED BY : Michele Rousseau
26.*  CLASS         : CS1A
27.*  SECTION       : MW: 7:30a - 12:00p
28.*  LAB #8        : Intro to Programming
29.************************************************
30.
31.Enter the first integer: 32
32.Enter the second integer: 41
33.
34.32 + 41 = 73
35.The average is: 36
36.
37.
38.Enter the first integer: 24
39.Enter the second integer: 1258
40.
41.24 + 1258 = 1282
42.The average is: 641.00
43.
44.
45.Enter the first integer: 34
46.Enter the second integer: 563
47.
48.34 + 563 = 597
49.The average is: 298.50
50.
```



Submit to a Canvas Discussion – All Files in a Single PDF (in this order)

Start each part on a new page

PART 1

1 – Output from part 1
2 – Source code from part 1 (printed to a PDF from eclipse)

PART 2

3 – HIPO chart from part 2 (include a variable list)
4 – Pseudocode from part 2
5 – Output from part 2
6 – Source code from part 2 (printed to a PDF from eclipse)