LAB 3.1 WORKING WITH THE cin STATEMENT

Copy and paste the following program into Visual Studio IDE.

```
// This program will read in the quantity of a particular item and its price.
// It will then print out the total price.
// The input will come from the keyboard and the output will go to
// the screen.

#include <iostream>
using namespace std;

int main()
{
    int quantity;          // contains the amount of items purchased
    float itemPrice;       // contains the price of each item
    float totalBill;       // contains the total bill.

    cout << "Please input the number of items bought" << endl;

    // Fill in the input statement below to bring in the quantity.

    // Fill in the output statement below to print a prompt to ask for the price.

    // Fill in the input statement below to bring in the price of each item.

    // Fill in the assignment statement below to determine the total bill.

    // Fill in the output statement below to print the total bill, with an appropriate message to the screen.

    return 0;
}
```

Exercise 1: Complete the program so that a sample run inputting 22 for the number of items bought and $10.98 for the price of each item will produce the results below.

Sample run of the program.

Please input the number of items bought
22
Please input the price of each item
10.98
The total bill is $241.56

Exercise 2: Alter the program so that the program first asks for the name of the product (which can be read into a string variable), so that the following sample run of the program will appear.

Please input the name of the item
Milk
Please input the number of items bought
4
Please input the price of each item
1.97
The item that you bought is Milk
The total bill is $7.88

Exercise 3: Now altar the program, if you have not already done so, so that the name of an item could include a space within its string (use function **`getline`**)

Please input the name of the item
Chocolate Ice Cream
Please input the number of items bought
4
Please input the price of each item
1.97
The item that you bought is Chocolate Ice Cream
The total bill is $7.88

(Print out the program and the running result for *Exercise 3*, and hand them in with the rest of the lab.)

LAB 3.2 WORKING WITH TYPE CASTING

Copy and paste the following program into Visual Studio IDE.

```
// This program will determine the batting average of a player.
// The number of hits and at bats are set internally in the program.

// PLACE YOUR NAME HERE

#include <iostream>
using namespace std;
const int AT_BAT = 421;
const int HITS = 123;

int main()
{
    int batAvg;

    batAvg = HITS / AT_BAT                                  // an assignment statement

    cout << "The batting average is " << batAvg << endl;    // output the result

    return 0;
}
```

Exercise 1: Does this program compile successfully? There is a syntax error. Fix it and the run the program.

Exercise 2: There is a logic error in this program (What is the output value of `batAvg`?). Does changing the data type of `batAvg` from `int` to `float` solve the problem? Make that change and run the program again.

Exercise 3: Continue to work with this program until you get the correct output result. The correct result should be 0.292162. Do not change the data type of the two named constants. Instead, use a typecast to solve the problem.

(Print out the program and the running result for *Exercise 3*, and hand them in with the rest of the lab.)

LAB 3.3 FORMATTING OUTPUT

Look at the following table:

PRICE	QUANTITY
1.95	8
10.89	9

Assume that from the left margin, the price takes up fifteen spaces. We could say that the numbers are right justified in a 15-width space. Starting where the price ends, the next field (quantity) takes up twelve spaces. We can use the statement `setw(n)` where `n` is some integer to indicate the width to produce such tables.

Copy and paste the following program into Visual Studio IDE.

```
// This program will bring in two prices and two quantities of items
// from the keyboard and print those numbers in a formatted chart.

#include <iostream>
#include _______________     // Fill in the code to bring in the library for formatted output.

using namespace std;

int main()
{
    float price1, price2;               // The price of 2 items
    int   quantity1, quantity2;         // The quantity of 2 items

    cout << setprecision(2) << fixed << showpoint;
    cout << "Please input the price and quantity of the first item" << endl;

    // Fill in the input statement below that reads in price1 and quantity1 from the keyboard.

    // Fill in the output statement below that prints a prompt for the second price and quantity.

    // Fill in the input statement below that reads in price2 and quantity2 from the keyboard.

    cout << setw(15) << "PRICE" << setw(12) << "QUANTITY" << endl;

    // Fill in the output statement below that prints the first price and quantity.
    // Be sure to use setw() statements.

    // Fill in the output statement below that prints the second price and quantity.

    return 0;
}
```

Exercise 1*:* Finish the code above by filling in the blanks and the instructions necessary to execute the following sample run. Note that two or more data items can be input at one time by having at least one blank space between them before hitting the enter key.

Please input the price and quantity of the first item
1.95 8
Please input the price and quantity of the second item
10.89 9

PRICE	QUANTITY
1.95	**8**
10.89	**9**

(Print out the program and the running result for *Exercise 1*, and hand them in with the rest of the lab.)

LAB 3.4 ARITHMETIC OPERATIONS AND MATH FUNCTIONS

Copy and paste the following program into Visual Studio IDE.

```
// This program will input the value of two sides of a right triangle and then
// determine the size of the hypotenuse.

#include <iostream>
#include <cmath>                // needed for math functions like sqrt()
using namespace std;

int main()
{
    float a,b;                  // the smaller two sides of the triangle
    float hyp;                  // the hypotenuse calculated by the program

    cout << "Please input the value of the two sides" << endl;
    cin >> a >> b;

    // Fill in the assignment statement below that determines the hypotenuse

    cout << "The sides of the right triangle are " << a << " and " << b << endl;
    cout << "The hypotenuse is " << hyp << endl;

    return 0;
}
```

The formula for finding the hypotenuse is *hyp* = $\sqrt{a^2 + b^2}$. How can this be implemented in C++? Hint: You will use two pre-defined math functions (one of them twice) learned in this lesson. One of them will be "inside" the other.

Exercise 1*:* Fill in the missing statement so that the following sample run is implemented:

Please input the value of the two sides
9 3
The sides of the right triangle are 9 and 3
The hypotenuse is 9.48683

Exercise 2*:* Alter the program so that the sample run now looks like the following:

Please input the value of the two sides
9 3
The sides of the right triangle are 9 and 3
The hypotenuse is 9.49

Note: This is not a trivial change. You must include another directive as well as use the formatted output features discussed in Chp 3. Notice that the change is made only to the value of the hypotenuse and not to the values of 9 and 3.

(Print out the program and the running result for *Exercise 2,* and hand them in with Labs 3.1 to 3.3.)