

Programming Fundamentals I

COSC1436--Fall 2015

Lab 3. Input/Output & Arithmetic Expressions¹

Objectives:

1. To become familiar with input statements using `cin`, `>>`, and the `get()` function.
2. To become familiar with output statements using `cout` and `<<` and `output` formatting manipulators.
3. To become with `arithmetic operations`, `type conversion`, and `type casting`.
4. To practice `flowcharting` and basic `algorithm design`.

Make sure to demo your work to your instructor for each task to get credit and upload the flowchart of the last task to D2L dropbox.

Task 1: Working with `input statements`

Exercise 1. Create a new C++ project in Visual Studio, add a new C++ file and copy the shown below:

```
// This program will read in the price of a particular item and the number
// purchased. It will then calculate and output the total price.
// The input will come from the keyboard and the output will go to the screen.
// PLACE YOUR NAME HERE

#include <iostream>
#include <iomanip>

using namespace std;
int main()
{
    float price; // price of each item
    int quantity; // number of items purchased
    float totalPrice; // total price of all items purchased

    cout << "Enter the price of an item" << endl;

    // Write an input statement to read value entered by user and store it
    // in variable price.

    // Prompt user to enter the quantity.

    // Write statement to read input for the quantity

    // Write a statement to calculate the total price and assign it to totalPrice.

    // Write an output statement to display the output with proper label e.g,
    // Total Price is: $1762.34
    return 0;
}
```

¹ Many of the exercises in this lab are from Gaddis Lab Manual (SOW C++ 7/e)

Exercise 2. Build your project and make sure it runs.

Exercise 3. Make the additions indicated in the comments. Build program and test it.

Exercise 4. Demo your program for credit.

Task 2: More input

Exercise 1. Add statements to your program of the previous task to do the following:

- prompt user to enter a one word description of the product.
- read the description into a variable named *description* of type *string* (hint: need to add a preprocessor directive and a variable declaration)
- after computing the total, display purchase receipt in the following format:

EverythingForSale.com

Purchase receipt

Product description:	Iphone6
Unit price:	\$560.99
Quantity:	2
Total:	\$1121.98

Exercise 2. Build your program and test it.

Exercise 3. Modify your program so that it accepts product descriptions consisting of multiple words (separated by blank spaces) entered in one line of input.

Demo modified program to your instructor.

Task 3: Working with output

Exercise 1. Modify your program of the previous task so that prices are always displayed with exactly 2 decimal digits (e.g. if the unit price of a product is 2.50 and the quantity is 6, the output will be:

EverythingForSale.com

Purchase receipt

Product description:	Reese Chocolate Bar
Unit price:	\$2.50
Quantity:	6
Total:	\$15.00

Exercise 2. Modify your program so that it reads information for two products, computes and displays the total price for each in a table format similar to the one below:

Description	Quantity	Unit Price	Total Price
Reese Chocolate Bar	6	\$2.50	\$15.00
IPhone6	2	\$560.99	\$1121.98

Hint: Description is left justified in a 25 characters wide field, Quantity is left-justified in a 10 character field, while Unit Price and Total Price are left-justified in a 15 characters-wide field each.

Exercise 3. Build your program, test it and debug. **Give a demo to your instructor for credit.**

Task 4: Basic Arithmetic, type coercion, type casting, increment and decrement

Exercise 1. Consider the program below. Predict the output of each of the output statements in the program.

```
#include <iostream>
using namespace std;

int main()
{
    cout << 2 + 3 * 5 << endl;           // 17
    cout << (2 + 3) * 5 << endl;         // 25
    cout << 3 * 7 - 6 + 2 * 5 / 4 + 6 << endl; // 23
    cout << 12.8 - 17.5 - 34.50 << endl;   // -39.2
    cout << 12.8 - (17.5 - 34.50) << endl; // 29.8
    cout << 2 + 3.5 << endl;              // 5.5
    cout << static_cast<int>(2 + 3.5) << endl; // 5
    cout << 17/3 << endl;                  // 5
    cout << 17.0/3 << endl;                // 5.66667
    cout << static_cast<float>(17)/3 << endl; // 5.66667
    cout << static_cast<float>(17/3) << endl; // 5
    cout << 17%3 << endl; 2

    int x = 5;
    x++;
    cout << x << endl;           // 6

    x = 5;
    ++x;
    cout << x << endl;           // 6

    x = 5;
    cout << x++ << endl;         // 5

    x = 5;
    cout << ++x << endl;         // 6

    return 0;
}
```

Exercise 2. Enter the program in Visual Studio, build it and run it. Explain any discrepancies with your expected output.

Task 5: Working with output files

Exercise 1. Enter the program below in the source C++ file of a new project in Visual Studio.

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

#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 that determines the hypotenuse

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

    return 0;
}
```

Exercise 2. Fill in the missing statement to compute the hypotenuse.

Exercise 3. Make appropriate changes so that you the following sample ran is implemented:

```
Please input the value of the two sides
6 7
The sides of the right triangle are 9 and 3
The hypotenuse is 9.22
```

Task 6: Write your own program—Woody Furniture Sales

The Woody furniture company sells the following three styles of chairs:

Style	Price Per Chair
American Colonial	\$ 85.00
Modern	\$ 57.50
French Classical	\$127.75

You are to write a program that will input the amount of chairs sold for each style. It will print the total dollar sales of each style as well as the total sales of all chairs in fixed point notation with two decimal places.

Sample run:

Please input the number of American Colonial chairs sold

20

Please input the number of Modern chairs sold

15

Please input the number of French Classical chairs sold

5

The total sales of American Colonial chairs \$1700.00

The total sales of Modern chairs \$862.50

The total sales of French Classical chairs \$638.75

The total sales of all chairs \$3201.25

- Step 1.* Develop a flow chart for solving the above problem. Draw the flow chart using paper and pencil first. You may then use Visio, Microsoft Word, or any flowcharting tool to save in an electronic file for submission.
- Step 2.* Create a project in Visual Studio and write the code that corresponds to your flow chart. Test your program with the above sample input.
- Step 3.* Demo your program to your instructor and upload your flow chart to the Dropbox on D2L.