



# Programming Fundamentals (Lab 2019)



## Lab Manual

Computer Science for Session 2019 (Fall-2019)

### Programming Fundamentals

(Lab 2)

**Target:** Variables and Cin, Data types, Operators, Comments, string, Escape sequences.

i) **Guidelines/Instructions:**

- Create meaningful variable names. Add comments for readability. Indent each line of your code.
- Plagiarism/Cheating is highly discouraged by assigning 0 to both who tried and one who shared his/her code.
- Lab work must be evaluated during lab timing and homework is for submission.
- Contact your teacher and GAs during their office hours (mentioned at end of lab.)

ii) **Reading Material:**

- **Consult Chapter No 2 of book “C++: Programming from Problem Analysis to Program Design by D.S Malik (latest edition)” for better understanding of given problems.**
- Structure, data type and variables in C++:  
(<https://www.studytonight.com/cpp/datatypes-and-modifiers-in-cpp.php>)
- Learn C++:  
([https://www.tutorialspoint.com/cplusplus/cpp\\_data\\_types.htm](https://www.tutorialspoint.com/cplusplus/cpp_data_types.htm))
- C++ programming examples:  
(<https://www.programiz.com/cpp-programming/examples>)

iii) **Tasks to be completed in lab:**

**Example program 1:**

```
/**
// This is a simple C++ program. It displays four lines of text, including the sum of two numbers,
will explain concept of variables and use of operators.
**/
```

```
#include <iostream>
using namespace std;
int main()
{
    int num;
    num = 6;
    cout << "My first C++ program." << endl;
    cout << "The sum of 2 and 3 = " << 5 << endl;
    cout << "7 + 8 = " << 7 + 8 << endl;
    cout << "Num = " << num << endl;
    return 0;
}
```

Instructor: Ms. Sahar Waqar

Graduate Assistant: Mr. Muhammad Nazam Maqbool, Mr. Usman Ghani



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**Sample Run:** (When you compile and execute this program, the following four lines are displayed on the screen.)

```
My first C++ program.  
The sum of 2 and 3 = 5  
7 + 8 = 15  
Num = 6
```

## Example Program 2:

\*\*\*\*\*

//This program illustrates how data in the variables are manipulated and working of string data type.

\*\*\*\*\*

```
#include <iostream>
#include <string>
using namespace std;
int main()
{
    int num1, num2; //declaration
    double sale;
    char first;
    string str;      // a variable named str of data type string is declared.
    num1 = 4;        // initialization
    cout << "num1 = " << num1 << endl;    // printing values
    num2 = 4 * 5 - 11;
    cout << "num2 = " << num2 << endl;
    sale = 0.02 * 1000;
    cout << "sale = " << sale << endl;
    first = 'D';
    cout << "first = " << first << endl;
    str = "It is a sunny day.";
    cout << "str = " << str << endl;
    return 0;
}
```

## **Sample Run:**

```
num1 = 4
num2 = 9
sale = 20
first = D
str = It is a sunny day.
```

1. Write a C++ program to declare an integer and a float variable and assign 10 and 12.6 to them respectively. It then prints these values on the screen. Now, assign 14.5 to variable with datatype **int** and 14 to the variable with datatype **float**. Print them again and observe the difference.
2. Write a program that reads 3 numbers (int, char and double) from stdin and print their values to stdout.
3. Write a C++ program that takes input from five inputs from user i.e. marks of math, science, Arabic, Pak studies and English and finds average of the marks. (Math = 80 , Science = 67, Arabic = 65 , Studies = 88 , English = 56.)

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4. Write and run a program that will read radius  $r$  from the keyboard, and calculates the circumference using the formula:  $C = 2 \cdot \pi \cdot r$ . Finally display the circumference  $C$ . You need to declare a variable **pi** for evaluating it. (Try declaring it with **const** and observe the difference between the following **int pi = 3.414;** and **const int pi = 3.414;**)
5. Write a program that inputs basic salary and calculates 15% medical allowance, 25% house rent and then displays the gross salary.
6. Write a C++ program to prompt the user to input 3 integer values (multiple cin) and print these values in forward and reversed order.
7. Write a program to swap the values of two variable using third variable.
8. Write a program to print the ASCII value of a character.
9. Write a [C++ program to find size of int, float, double, long and char in your system](#).
10. Write C++ statements that prints following line on terminal "I am learning to print "double quotes on terminal""
11. Write a C++ program that prints your education information on terminal in chronological order using escape codes. It should be properly formatted as discussed in Chapter 2. Check for alignment and spacing details. (You will not use **spacebar** to add spaces, **endl** for newline instead use **\t** (tab space) and **\r** (newline/enter)).

Example:

Name: Maria Basit

Degree	School/College Name	Marks
Matriculation	Govt. girl's H/S school, Samanabad Lahore	86%
Intermediate	Punjab College, Girls campus, Lahore	85%

#### iv) Tasks to be submitted:

1. Write a program to swap the values of two variable without using third variable.
2. Write a program which accepts a character and display its next character.
3. To make a profit, a local store marks up the prices of its items by a certain percentage. Write a C++ program that reads the original price of the item sold, the percentage of the marked-up price, and the sales tax rate. The program then outputs the original price of the item, the percentage of the mark-up, the store's selling price of the item, the sales tax, and the final price of the item. (The final price of the item is the selling price plus the sales tax.)
4. Write a program to find out the area of triangle when three sides  $a$ ,  $b$  and  $c$  of the triangle are given. Use appropriate statements to input the values of  $a$ ,  $b$  and  $c$  from the keyboard. Formula for the area of triangle is **area =  $(s(s-a)(s-b)(s-c))^{1/2}$**  where  **$s=(a+b+c)/2$**
5. Write a C++ program that prompts the user to input the elapsed time for an event in seconds. The program then outputs the elapsed time in hours, minutes and seconds. (For example, if elapsed time is 9,630 seconds, then the output is 2:40:30.)
6. Newton law states that the force  $F$ , between two bodies of masses  $M_1$  and  $M_2$  is given by the equation shown below. In which  $k$  is the gravitational constant and  $d$  is the distance between the bodies. The value of  $k$  is approximately  $6.674 \times 10^{-11} \text{ m}^3 \cdot \text{kg}^{-1} \cdot \text{s}^{-2}$ . Write a program that prompts the user to input the masses of the bodies and the distance between the bodies. The program then outputs the force between the bodies.

$$F = k \left( \frac{M_1 M_2}{d^2} \right)$$

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7. If you buy a 40GB hard drive, then chances are that the actual storage on the hard drive is not 40GB. This is because, typically, a manufacturer uses 1000 bytes as the value of 1K bytes, 1,000 K bytes as the value of 1MB, 1,000 MB as the value of 1 GB. Therefore, a 40 GB hard drive contains 40,000,000,000 bytes. However, in computer memory as given in chapter 1 of the C++ programming book by D.S Malik, 1 KB is equal to 1,024 bytes, and so on. So, the actual storage on a 40 G hard drive is approximately 37.25 GB. Write a program that prompts the user to enter the size of the hard drive specified by the manufacturer, on the hard drive box, and outputs the actual storage capacity of the hard drive.
8. A milk carton can hold 3.78 liters of milk. Each morning, a dairy from ships cartons of milk to a local grocery store. The cost of producing one liter of milk is \$.038, and the profit of each carton of milk is \$.027. Write a program that does the following:
  1. Prompts the user to enter the total amount of milk produced in the morning.
  2. Outputs the number of milk cartons needed to hold milk. (Round your answer to the nearest integer)
  3. Outputs the cost of producing milk.
  4. Outputs the profit for producing milk.

v) **Submission instructions:**

- See manual 1 for understanding “How to submit your assignment”.
- All rules discussed in lab1 for grading assignments will apply for all labs of this course.

vi) **Office hours and email address for communication:**

- See lab manual 1 for details.

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