National University of Computer and Emerging Sciences

Lab Manual #8

Programming Fundamentals

(Section BCS-1E)

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Objectives

The objectives of this lab are to cover the following:

- To learn Simple Functions
- Functions with parameter
- Functions with Loops
- Arrays

Function:

A function is a group of statements that is given a name, and which can be called from some point of the program. The most common syntax to define a function is:

```
type name ( parameter1, parameter2, ...) { statements }
```

Where:

- **type** is the type of the value returned by the function.
- **Name** is the identifier by which the function can be called.
- **Parameters** (as many as needed): Each parameter consists of a type followed by an identifier, with each parameter being separated from the next by a comma. Each parameter looks very much like a regular variable declaration (for example: int x), and in fact acts within the function as a regular variable which is local to the function. The purpose of parameters is to allow passing arguments to the function from the location where it is called from.
- **Statements** is the function's body. It is a block of statements surrounded by braces { } that specify what the function actually does.

Example:

```cpp// function example#include <iostream>using namespace std;int addition (int a, int b){ int r; r=a+b; return r;}int main (){ int z; z = addition (5,3); cout << "The result is " << z;}```	Output: The result is 8

Question#1

Write a C++ program that does the following:

Declares an array alpha of 50 components of type float.

Initialize the array so that the first 25 components are equal to the square of the index variable, and the last 25 components are equal to three times the index variable.

Output the array so that 10 elements per line are printed

Question#2

(Intersection of Sets) Use one-dimensional arrays to solve the following problem. Read in two sets of numbers, each having 10 numbers. After reading all values, and display the unique elements common to both sets of numbers.

Question#3

Write C++ program that will ask the user to enter the width and length of a rectangle and then display the rectangle's area. The program calls the following functions, which have not been written:

- **getLength** – This function should ask the user to enter the rectangle's length and then return that value as a double.
- **getWidth** – This function should ask the user to enter the rectangle's width and then return that value as a double.
- **getArea** – This function should accept the rectangle's length and width as arguments and return the rectangle's area. The area is calculated by multiplying the length by the width.
- **displayData** – This function should accept the rectangle's length, width, and area as arguments and display them in an appropriate message on the screen

Question#4

Write a C++ program to swap two values, Your main function should input two numbers from the user and pass those values to a Void function named SwapbyValue() and Swapbyreference() .And then output the swap variable values in main function.

void swapbyvalue(int x, int y);

void swapbyreference(int &x, int y);

Question#5

When an object is falling because of gravity, the following formula can be used to determine the distance the object falls in a specific time period:

$$d = 1/2 * g * t^2$$

The variables in the formula are as follows: d is the distance in meters, g is 9.8, and t is the amount of time, in seconds, that the object has been falling.

Write a function named falling Distance that accepts an object's falling time (in seconds) as an argument. The function should return the distance, in meters, that the object has fallen during that time interval. Write a program that demonstrates the function by calling it in a loop that passes the values 1 through 10 as arguments and displays the return value.

Question#6

In physics, an object that is in motion is said to have kinetic energy. The following formula can be used to determine a moving object's kinetic energy:

$$KE = 1/2 \ m * v^2$$

The variables in the formula are as follows: KE is the kinetic energy, m is the object's mass inkilograms, and v is the object's velocity, in meters per second.

Write a function named kinetic Energy that accepts an object's mass (in kilograms) and velocity (in meters per second) as arguments. The function should return the amount of kinetic energy that the object has. Demonstrate the function by calling it in a program that asks the user to enter values for mass and velocity

Question#7

Write a function name CalculateGPA(), that returns the gpa achieved by a student, take grades for five courses and their respective credit hours, apply the following formula to calculate gpa:

Gpa = (GradeWeight*CreditHours)/Total CreditHours

Grades	Grade Point Equivalent
A	4.00
A-	3.67
B+	3.33
B	3.00
B-	2.67
C+	2.33
C	2.00
D	1.00
F	0.00

Use the above-mentioned table to get grade weights. Limit your functionality for grades A, B, C, D and F only. Return a double value from the function.