LAB NO: 8

Date:

FUNCTIONS

Objectives:
In this lab, student will be able to:

1. understand modularization and its importance
2. define and invoke a function
3. analyze the flow of control in a program involving function call
4. write programs using functions

Introduction

- A ***function*** is a set of instructions to carry out a particular task.
- Using functions programs can be structured in a **more modular** way.

Function definition and call

```
// FUNCTION DEFINITION
 Return type     Function name     Parameter List
void DisplayMessage(void)
{
        cout << "Hello from function DisplayMessage\n";
}
void main()
{
        cout << "Hello from main";
        DisplayMessage(); // FUNCTION CALL
        cout << "Back in function main again\n";
 }
```

Solved exercise
Code snippet explaining concept of multiple functions

```
void First (void){          // FUNCTION DEFINITION
        cout << "I am now inside function First\n";
}
void Second (void){         // FUNCTION DEFINITION
        cout << "I am now inside function Second\n";
        First();            // FUNCTION CALL
        cout<<"Back to Second\n";
}
void main (){
        cout << "I am starting in function main\n";
        First ();           // FUNCTION CALL
        cout << "Back to main function \n";
        Second ();          // FUNCTION CALL
        cout << "Back to main function \n";
}
```

Lab exercises

With the knowledge of modularization, function definition, function call etc., write C++ programs which implement simple functions and recursive functions.

Write C++ programs as specified below:

Simple Functions

1. Write a function **Fact** to find the factorial of a given number. Using this function, compute ${}^{N}C_{R}$ in the main function.

2. Write a function **IsPrime** to check whether the given number is prime or not. Using this function, generate first N prime numbers in the main function.

3. To obtain the roots of the polynomial 1x^3+ 0x^2 -1x^1 -3x^0, with maximum power of 3 having initial value x1=3 using Newton Raphson's method.

4. To obtain sum of n^{th} term for the series 1+x/1! + x^2/2! + x^3/3! + x^4/4!..x^x/x!, using Taylor's series method.

5. To demonstrate functionality of Newton's Forward difference method for the following records, with x=2.35

X	2.0	2.25	2.5	2.75	3
f(x)	9	10.06	11.25	12.56	14

Functions taking (1D/2D) as array Parameter

1. Write a function **Largest** to find the maximum of a given list of numbers. Also write a main program to read N numbers and find the largest among them using this function.

2. Write a function **Sort** to sort a list of names which will use a function **compare** to compare two names. (Bubble sort may be used).

Additional exercises

1. Write a function **IsPalin** to check whether the given string is a palindrome or not. Write a main function to test this function.

2. Write a function **CornerSum** which takes as a parameter, no. of rows and no. of columns of a matrix and returns the sum of the elements in the four corners of the matrix. Write a main function to test the function.

3. To find the value of integral using Trapezoidal rule for the following records.

X	7.47	7.48	7.49	7.50	7.51	7.52
f(x)	1.93	1.95	1.98	2.01	2.03	2.06

4. To find the value of integral using Simpson's $1/3^{rd}$ rule for the following records.

X	0	0.25	0.5	0.75	1
f(x)	1	0.8	0.6667	0.5714	0.5

5. To find the value of integral using Simpson's $3/8^{th}$ rule for the following records.

X	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
f(x)	1.001	1.008	1.027	1.064	1.125	1.216	1.343	1.512	1.729	2.0