

Object-Oriented Programming Lab

SPRING - 2024

LAB 04



FAST National University of
Computer and Emerging
Sciences

Learning Outcomes

In this lab you are expected to learn the following:

- Recursion

RECURSION

A recursive function is one that calls itself.

Example

```
void print(int n) {  
    if ( n <= 0 )  
        return; //Base condition  
    cout << n << " "; //Prints number n  
    print(n-1); //Calls itself with (n-1)  
    return; //Returns from the function  
}
```

Output

```
5 4 3 2 1  
C:\Users\hp\source\repos\Lab01\x64\Debug\Lab01.exe (process 4736) exited with code 0.  
Press any key to close this window . . .
```

Lab Tasks

Problem 1.

A palindrome is a string that is spelled the same way forward and backward. Some examples of palindromes are radar and madam etc. Write a recursive function that takes a string and checks whether it is a palindrome or not.

Example:

isPalindrome("MADAM",0,5) will return true.

Prototype of Function: bool isPalindrome(string str, int start, int length)

Problem 2.

The Fibonacci sequence is a series where the next term is the sum of the previous two terms. The first two terms of the Fibonacci sequence are 0 followed by 1. The Fibonacci sequence: 0, 1, 1, 2, 3, 5, 8, 13, 21. Write a function fab that takes an index of the series as an argument and returns the value in the Fibonacci series.

Examples:

fibonacci (4) will return 3

fibonacci (6) will return 8

Prototype of Function: int fibonacci(int n)

Problem 3.

Write a recursive function that receives an integer n as an argument and returns the number of digits greater or equal to 5 in the octal representation of n.

Examples:

DecimalToOcta(55) will return 2 // $(55)_{10} = (67)_8$

DecimalToOcta(92) will return 0 // $(92)_{10} = (134)_8$

Prototype of Function: int DecimalToOcta(int n)

Problem 4.

Write a recursive function to print the following pattern against a number entered by the user.

Input: 5

Output Pattern



Problem 5.

Write a C++ recursive function to print the following pattern.

Prototype of Function: void diamond_pattern(int num)

For n=13, n=11, n=9, n=7

