National University of Computer and Emerging Sciences



Lab Manual 12

Programming Fundamentals

|  |  |
| --- | --- |
| Course Instructor | Mr. Waqas Manzoor |
| Lab Instructor (s) | Ms.Shazia Ahmed  Mr. Adeel Qayyum |
| Section | E |
| Semester | Fall 2020 |

Department of Computer Science

FAST-NU, Lahore, Pakistan

## 

**Problem1:**

Write a recursive function, **vowels**, that returns the number of vowels in a string. Also, write a program to test your function.

**Sample Output:**

Enter String: I am a boy

Number of vowels: 3

**Problem 2:**

Write a recursive function that finds and returns the sum of the elements of an int array. Also, write a program to test your function.

**Sample Output:**

Enter 10 Array Elements: 1

2

3

4

5

6

7

8

9

10

Sum = 55

**Problem 3:**

A palindrome is a string that reads the same both forward and backward. For example, the string "madam" is a palindrome. Write a program that uses a recursive function to check whether a string is a palindrome. Your program must contain a value-returning recursive function that returns true if the string is a palindrome and false otherwise. Do not use any global variables; use the appropriate parameters.

**Sample Output:**

Enter String: abcba

Yes a palindrome

**Problem 4:**

**(Greatest Common Divisor)** Given two integers x and y, the following recursive definition determines the greatest common divisor of x and y, written gcd(x,y).



Note: In this definition, % is the mod operator.

Write a recursive function, **gcd,** that takes as parameters two integers and returns the greatest common divisor of the numbers. Also, write a program to test your function.

**Sample Output:**

Enter value of X: 15

Enter value of Y: 20

GCD = 5