National University of Computer and Emerging Sciences

Lab Manual

for

Data Structures

Course Instructor	Ma'am Abeeda Akram
Lab Instructor(s)	Mr. Sohaib Ahmad Ms. Ammara Nasir
Section	BCS-3A
Semester	FALL 2022

Department of Computer Science FAST-NU, Lahore, Pakistan

Lab Manual 07

Objectives:

After performing this lab, students shall be able to revise:

✔ Recursion

Question1:

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.

Question2:

Write a recursive method that for a positive integer returns a string with commas in the appropriate places, for example, putCommas(1234567) returns the string "1,234,567."

Question3:

Write a recursive method void print01(int k); that prints all 0/1 strings of length k. For example, if k=1, the program should print 0 and 1. If k=2, it should print 00, 01, 10, and 11, etc

Question4:

Find the number of ways r different things can be chosen from a set of n items, where r and n are nonnegative integers and r<= n. Suppose C(n, r) denotes the number of ways r different things can be chosen from a set of n items. Then C(n, r) is given by the following formula:

$$C(n, r) = \frac{n!}{r!(n-r)!}$$

where the exclamation point denotes the factorial function. Moreover, C(n, 0)=C(n, n) =1. It is also known that C(n, r)=C(n – 1, r – 1) + C(n – 1, r).

a) Write a recursive algorithm to determine C(n, r). Identify the base case(s) and the general case(s).
b) Using your recursive algorithm, determine C(5, 3) and C(9, 4)

Question5:

Remove all the consecutive duplicates from the string using recursion. For example, if given string is
Input: aaaabbbcdddeee
Output: abcde

Good Luck!