

National University of Computer and Emerging Sciences



Lab Manual
for
Data Structure

Course Instructor	Ms. Tayyaba Bukhari
Lab Instructor(s)	Ms. Sonia Anum Ms. Samia Akhter
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Department of Computer Science
FAST-NU, Lahore, Pakistan

Lab Manual 07

Objectives:

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

- ✓ Recursion

Problem 1

Implement a **Class Node** that has following data members. Node*data, int data

Implement a stack class that has data members Node* top and also make function according to your need.

Perform this functionality

- sort stack using recursion
- reverse stack using recursion

Problem 2

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 in linked list 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.

Problem 3

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."

Problem 4

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

Problem 5

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 $r \leq n$. 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 $C(9, 4)$.

