



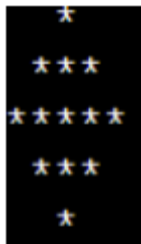
National University
of computer and emerging sciences

CL-1004
Object Oriented Programming- Lab
Spring' 2023
BS-SE

Lab Manual 04

Problem 1:

Write a recursive function that shall print the following pattern. Note, you are not allowed to use any of the loops in the recursive function.



Prototype: void print_pattern (char ch, int n)

Problem 2:

Write a recursive function ReturnMin which takes 3 arguments: an array of type integer, int index, int length and returns the minimum value of the array. Index is the starting index of the array, while length is the length of the array.

Prototype: int returnMini(int arr[], int index, int len)

Problem 3:

Write a recursive function printPrimeFactors to print all prime factors for a given positive integer. A prime factor is a factor that is also a prime number. In other words, it's one of the smallest components of the number, and it can only be divided by 1 and by itself.

Prototype: void printPrimeFactors(6) prints 2 3 1

Problem 4:

Write a function func1 that prints out the numbers 98765432100123456789 using recursion.

Prototype: int print_num (int n)

Problem 5:

Write a recursive function PrintPattern to print pattern that takes two integer arguments n and k. n is the starting number while k is the ending limit.

Example:

Void PrintPattern(1, 5) will print the following pattern.

*1**2***3****4*****5+++++4+++3++2+1

For printing a character inside PrintPattern() you are required to write another recursive function PrintChar, that takes two arguments char ch and int t. This function would print a char ch at t times on screen.

Example:

Void PrintChar('*',4) will print on screen ****

Problem 6:

- a) Write a function that shall take the information of 5 students from the user and store it in struct type array. Do this using getter, setter functions. The information shall includes:

- RollNum
- Name.
- Department.
- Batch.
- CGPA.

Getter/Setter Functions:

1. Int getRollNum(), void setRollNum(int i)
2. String getName(), void setName(string name)
3. String getDep(), void setDep(string dp)
4. Int getBatch(), void setBatch(int bat)
5. float getCGPA(), void setCGPA(float gpa)

- b) Write a function that shall sort the struct type array (developed in previous task) on the basis of GPA (ascending order) and prints the array.

Void sortStudent(student arr[], int s)

- c) Write a function that shall print the following student information

- Student with highest GPA in array.
- Student with lowest GPA in array.
- Student with average GPA in array.

Void printInfo(student arr[], int s)

Problem 7:

- a) Write a program to define a structure Employee that has the following data members empNo as int, basicPay as long, houseRent as long, medicalAllow as long, conveyanceAllow as long, netPay as long.

- b) Compute the allowances based on basic pay and Allowances are computed as:

- House rent is 54% of the basic pay.
- Medical Allowance is 15% of the basic pay.
- Conveyance allowance is 20% of the basic pay
- Compute net pay

You have to define following member functions in Employee structure.

```
void setBasicPay(long bp)
long getBasicPay()
void setEmpNo(int e)
int getEmpNo()
void calculateHouseRent()
void calculateMedicalAllowance()
void calculateConveyanceAllowance()
void calculateNetPay()
long gethouseRent()
long getMedicalAllowance()
long getConveyanceAllowance()
long getNetPay()
```

- c) Write a function named as Swap that takes two parameters of type Employee: emp1 and emp2. You are required to swap values of these parameters.

*Note you are not allowed to copy complete object using assignment operator(=) rather you have to copy

each data member separately into its corresponding data member.

```
void Swap(Employee & emp1, Employee & emp2)
```