**CS112- PROGRAMMING FUNDAMENTALS**

**ARRAYS**

1. In your program, create an array int a[30, 40,5,10,70,20], sort its contents in ascending order.
2. Write a C program to read elements in a matrix and find the sum of main diagonal (major diagonal) elements of matrix.
3. Write a C program to read elements in a matrix and find sum of upper triangular matrix.
4. Write a C program to check whether entered matrix is magic square or not.
5. Write a C program to print square of each element of a matrix.
6. Write a C program to read elements in a matrix and find sum of lower triangular matrix.
7. Write a C program to **find inverse of a 3 X 3 Matrix.**
8. A local zoo wants to keep track of how many pounds of food each of its three monkeys eats each day during a typical week. Write a program that stores this information in a two dimensional 3 × 7 array, where each row represents a different monkey and each column represents a different day of the week. The program should first have the user input the data for each monkey. Then it should create a report that includes the following information:

• Average amount of food eaten per day by the whole family of monkeys.

• The least amount of food eaten during the week by any one monkey.

• The greatest amount of food eaten during the week by any one monkey.

1. Write a program to search for the "saddle points" in a 5 by 5 array of integers. A saddle point is a cell whose value is greater than or equal to any in its row, and less than or equal to any in its column. There may be more than one saddle point in the array. Print out the coordinates of any saddle points your program finds. Print out "No saddle points" if there are none.

**STRINGS**

1. Write a program in C to print individual characters of string in reverse order.
2. Create a program that can take a string as input and determine whether it is a palindrome or not.
3. Write a C Program which will accept string from the user. Pass this string to the function. Calculate the length of the string using pointer.
4. Write a program in C to compare two string without using string library functions

Test Data :   
Input the 1st string : This is first string   
Input the 2nd string : This is first string

*Expected Output*:

The length of both strings are equal and

also both strings are equal.

Write a C program to check whether a given substring is present in the given string

1. Write a program in C to check whether two given strings are an anagram.

Test Data :   
Input the first String : spare   
Input the second String : pears   
Expected Output :

spare and pears are Anagram.

**FUNCTIONS AND RECURSIVE FUNCTIONS**

1. Write a program in C to find the square of any number using the function.
2. Write a program in C to check a given number is even or odd using the function.
3. Write a program in C to swap two numbers using function
4. Write a program in C to find the sum of the series 1!/1+2!/2+3!/3+4!/4+5!/5 using the function.
5. Write a program in C to print all perfect numbers in given range using the function.
6. Write a program in C to check armstrong and perfect numbers using the function.
7. Write a program in C to print first 50 natural numbers using recursion.
8. Write a program in C to calculate the sum of numbers from 1 to n using recursion.
9. C Program to Multiply two Matrices using Recursion.
10. Find factorial of a number using recursion.
11. Generate Fibonacci series using recursion.
12. Write a program in C to print the array elements using recursion.

**POINTERS**

1. Write a program in C to add numbers using call by reference.

Test Data :   
Input the first number : 5   
Input the second number : 6   
*Expected Output* :

The sum of 5 and 6 is 11

1. Write a program in C to find the maximum number between two numbers using a pointer

Test Data :   
Input the first number : 5   
Input the second number : 6   
*Expected Output* :

6 is the maximum number.

1. Write a program in C to store n elements in an array and print the elements using pointer.
2. Write a program in C to swap elements using call by reference.
3. Write a program in C to find the factorial of a given number using pointers.
4. Write a C program to compute sum of the array elements using pointers.
5. Write a function that accept an address of a string (character array) and reverse the order of its contents.
6. Write a generalized function inArray () and outArray () that works with all the arrays passed to them by reference. The inArray () accept data from user and stores in array and outArray () will prints the data from the array.
7. Write a program that can be used to gather statistical data about the number of movies, college students watch in a month.

• The program should ask the user how many students were surveyed and use an array to store the number of students i.e. each student is an element of the array.

• The program should then allow the user to enter the number of movies each student has watched.

• The program should then calculate the average, median, and mode of the values entered.

Create a function that can return average, median, and mode without using return statement. Call this function from main( ) and print the results in main( ). Median is the middle value; median term = (n+1)/2. Here n is the total number of terms. Mode is the number that is repeated more often than any other.

1. Write a program to swap two strings, using pointers.
2. Write a C program using pointers to read in an array of integers and print its elements in reverse order.

**LIBRARY FUNCTIONS**

1. Write main () function which generates random number using the library function rand().

Hint: <https://www.tutorialspoint.com/c_standard_library/c_function_rand.htm>

1. Write a program to TOSS a coin three times and print the output whether it is HEAD or TAIL. (Hint use rand() function.)
2. Write a program in C to print the current time.