Sheet 1

I. Write a for and while loop that prints "Hello World!" infinite times.

II. Write a program that allots grade on the basis of percentage scored. (You can assume Grade A - % more than 90, Grade B - % more than 80 and so on up to Grade F.)

III. Write these numbers in Binary – 10, 21, 251, 399, 1024, 2012, 2048, 11892

IV. Write a program that takes 2 numbers as input and print sum of those numbers as output.

V. Write a program to print following patterns (Try to generalize the pattern for n lines):

```
1                1                      1                  1
12               2 3                  1 2 1              1 2 3
123              4 5 6              1 2 3 2 1          1 2 3 4 5
1234             7 8 9 10         1 2 3 4 3 2 1      1 2 3 4 5 6 7
12345            11 12 13 14 15  1 2 3 4 5 4 3 2 1    1 2 3 4 5
                                                         1 2 3
                                                          1
```

```
A           * * * * *      * * * * * * * * *          *
B B         * * * *          * * * * * * *          * * *
C C C       * * *              * * * * *          * * * * *
D D D D     * *                  * * *          * * * * * * *
E E E E E   *                      *              * * * * *
                                                   * * *
                                                     *
```

II. Write a program which will calculate frequency of each digit in a number by defining a user defined function for this purpose. Your program should not print digits of frequency 0. (Hint- use switch-case)

III. Write a program to count and print all the numbers between 1-1000 that are divisible by 3 and 5.

IV. Write a program to reverse a number and check if the number is palindrome.

V. Count the number of digits in a number.

VI. Write a program to swap two numbers (with or without using 3rd variable).

VII. Write a program to sort a given array in such a way that left part of array contains odd numbers while right part contains even numbers. These sub arrays of odd and even numbers need not to be in sorted order. Perform this operation with only one scan of array.

VIII. Write a program to find transpose of a given matrix of size m X n.

IX. Write a program to print the Fibonacci series using iteration and recursion.

X. Write an efficient program to check whether a given number is Prime or not.
Write a program to find prime number from 1 to N in a very fast way. (sieve of eranthoses)

XI. Write a program to print factorial of a number.

XII. Write a program to find least number among 3 given numbers.

XIII. Write a program to print GCD of two numbers using recursion and iteration.

XIV. Write a C program to generate a multiplication table.

XV. Write a C program to check a number is Armstrong or not.

XVI. Write a program to reverse an array without using any other array.

XVII. Write a program to find the second largest and second smallest element in an array.

XVIII. Write a program to calculate sum of elements in an array.

XIX. Write a program to search an element in a sorted or non-sorted array.

XX. Write a program to arrange numbers in an array, A from 1 to 100 in such a way that for all indexes i and j, A[i] <= A[j] where i<j.

XXI. Write a program to swap two values with the help of a function that call by address

XXII. **Spiral Matrix:** Given a two-dimensional matrix, write a program to print it in spiral form.
Example: Consider matrix A = { {1,2,3,4}, {5,6,7,8}, {9,10,11,12}, {13,14,15,16}}

Spiral representation of the matrix is: {1, 2, 3, 4, 8, 12, 16, 15, 14, 13, 9, 5, 6, 7, 11, 10} as shown in figure.
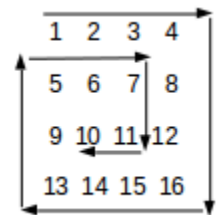
XXIII. Write a C program which on given an array finds the largest number possible after concatenating the arrays.
  for ex. input{40, 9, 8} output 9840
       input{ 98, 9, 7} output 9897.

XXIV. Write a C program which given a number tells if a number is strong or not.
{NOTE: **Strong numbers** are the numbers whose sum of factorial of digits is equal to the original number. Strong number is a number for which sum of factorials of the digits is equal to the given number.]
for ex 145 is strong number
1! + 4! + 5! = 1 + 24 + 120 = 145.