CSE 115 Lab on recursion – Ara2

1. **C program of a recursive function to find the sum of n natural numbers. For example: the number 5 will give an output of 15 since 5+4+3+2+1 = 15.**

```
#include <stdio.h>
int sum(int n);
void main()
{
    int num,add;
    printf("Enter a positive integer:\n");
    scanf("%d",&num);
    add=sum(num);
    printf("sum=%d",add);
}
int sum(int n){
    if(n==0)
       return 0;
    else
       return n+sum(n-1);  /*self call  to function sum() */
}
```

2. **Code that computes the factorial of a number using recursive function.**

```
#include<stdio.h>
int factorial(int x)
{
    if (n==1)
              return 1;
else
     return n*factorial(n-1);
}
```

```
void main()
{
    int N,i,result;
    printf("Enter N: \n");
    scanf("%d",&N);
    result = factorial(N);
    printf("%d! = %d",N,result);
}
```

3. **Code that computes the n-th Fibonacci number using recursive function.**

```
#include <stdio.h>

int fibonacci(int i) {

   if(i == 0) {
      return 0;
   }

   if(i == 1) {
      return 1;
   }
   return fibonacci(i-1) + fibonacci(i-2);
}

void main()
{
   int n;
   scanf("%d", &n);
   printf("%d\n", fibonacci(n));
}
```

4. **C program to print all natural numbers from 1 to n using recursion.**

```
#include <stdio.h>
// Recursively prints all natural number between the given range.
void printNaturalNumber(int lowerLimit, int upperLimit)
{
    if(lowerLimit > upperLimit)
        return;

    printf("%d, ", lowerLimit);

    //Recursively calls the function to print next number
    printNaturalNumber(lowerLimit+1, upperLimit);
}

void main()
{
    int limit;

    printf("Print all natural numbers from 1 to : ");
    scanf("%d", &limit);

    printf("All natural numbers from 1 to %d are: ", limit);
    printNaturalNumber(1, limit);
}
```

Exercise:

1. **Write a C code to find the sum of the following series using RECURSIVE FUNCTIONS:**
   $1^2 + 2^2 + 3^2 + \ldots + N^2$
2. **Write a C program using recursive function to find the inverse product of 1^{st} n natural numbers. E.g. for n= 5, the function should return (1/5) * (1/4) *(1/3) * (1/2) *(1/1) = 1/120 =0.00833**
3. **Compute the value of a^b using recursion, where a and b are integers.**
4. **Write a C program to print all natural numbers from n to 1 (i.e., from upper to lower) using recursion.**

Assignment:

1. **Compute the sum of the following geometric progression without recursion:**
   $1 + r + r^2 + \ldots + r^n$ (read the values of r and n from user)
2. **Compute the sum of the above geometric progression using recursion.**
3. **Write a C code to find the sum of the following series using recursion:**
   1/1! + 2/2! + 3/3! + ……1/N!
4. **Write a C program to compute sum of digits of a given number using recursion.**
   Sample input/output:
   Enter an integer: **5431**
   Sum of digits = 13
5. **Write a C program to print the digits of a given number in words using recursion.**
   Sample input/output:
   Enter an integer: **5431**
   Number in words: Five Four Three One