**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() \*/

}

1. **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);  } |

1. **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));  } |

1. **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:  
   12 + 22 + 32 + … + N2**
2. **Write a C program using recursive function to find the inverse product of 1st 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 ab 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 + r2 + … + rn (read the values of r and n from user)**

1. **Compute the sum of the above geometric progression using recursion.**
2. **Write a C code to find the sum of the following series using recursion:  
   1/1! + 2/2! + 3/3! + ……1/N!**
3. **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

1. **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