

## **Assignment - 13 A Job Ready Bootcamp in C++, DSA and IOT MySirG** **More on Recursion in C Language**

### **1. Write a recursive function to calculate sum of first N natural numbers**

#### **Program -**

```
#include <stdio.h>

int sumN(int);

int main()
{
    int N;
    printf("Enter the value of N: ");
    scanf("%d",&N);
    printf("Sum of first %d natural numbers is %d",N,sumN(N));
    return 0;
}

int sumN(int n)
{
    if(n == 1)
        return 1;

    return n + sumN(n-1);
}
```

#### **Output -**

Enter the value of N: 5  
Sum of first 5 natural numbers is 15

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### **2. Write a recursive function to calculate sum of first N odd natural numbers**

#### **Program -**

```
#include <stdio.h>

int sumN(int);

int main()
{
    int N;
    printf("Enter the value of N: ");
    scanf("%d",&N);
    printf("Sum of first %d odd natural numbers is %d",N,sumN(N));
    return 0;
}
```

```
int sumN(int n)
{
    if(n == 1)
        return 1;

    return 2*n-1 + sumN(n-1);
}
```

#### Output -

Enter the value of N: 5  
Sum of first 5 odd natural numbers is 25

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### 3. Write a recursive function to calculate sum of first N odd natural numbers

#### Program -

```
#include <stdio.h>

int sumN(int);

int main()
{
    int N;
    printf("Enter the value of N: ");
    scanf("%d",&N);
    printf("Sum of first %d odd natural numbers is %d",N,sumN(N));
    return 0;
}
```

```
int sumN(int n)
{
    if(n == 1)
        return 1;

    return 2*n-1 + sumN(n-1);
}
```

#### Output -

Enter the value of N: 5  
Sum of first 5 odd natural numbers is 25

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### 4. Write a recursive function to calculate sum of squares of first n natural numbers

#### Program -

```
#include <stdio.h>

int square(int);
```

```

int main()
{
    int N;
    printf("Enter the value of N: ");
    scanf("%d",&N);
    printf("Sum of square of first %d odd natural numbers is
        %d",N,square(N));
    return 0;
}

int square(int n)
{
    if(n == 1)
        return 1;

    return n*n + square(n-1);
}

```

#### Output -

Enter the value of N: 3  
Sum of square of first 3 odd natural numbers is 14

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### 5. Write a recursive function to calculate sum of digits of a given number

#### Program -

```

#include <stdio.h>

int digitSum(int);

int main()
{
    int N;
    printf("Enter a number: ");
    scanf("%d",&N);
    printf("Sum of digits of %d is %d",N,digitSum(N));
    return 0;
}

int digitSum(int n)
{
    if(n > 0)
        return n % 10 + digitSum(n/10);
}

```

#### Output -

Enter a number: 345  
Sum of digits of 345 is 12

## 6. Write a recursive function to calculate factorial of a given number

### Program -

```
#include <stdio.h>

int fact(int);

int main()
{
    int N;
    printf("Enter a number: ");
    scanf("%d", &N);
    printf("%d! = %d", N, fact(N));
    return 0;
}

int fact(int n)
{
    if(n == 0 || n == 1)
        return 1;

    return n * fact(n-1);
}
```

### Output -

```
Enter a number: 6
6! = 720
```

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## 7. Write a recursive function to calculate HCF of two numbers

### Program -

```
#include <stdio.h>

int HCF(int, int);

int main()
{
    int a, b, small, big;
    printf("Enter two numbers: ");
    scanf("%d%d", &a, &b);
    if(a > b)
    {
        small = b;
        big = a;
    }
    else
    {
        small = a;
        big = b;
    }
}
```

```

    }
    int h = HCF(small , big);
    printf("HCF = %d",h);
    return 0;
}

int HCF(int x , int y)
{
    if(y % x != 0)
        return HCF(y % x , x);

    return x;
}

```

### Output -

Enter two numbers: 9 6

HCF = 3

---

## 8. Write a recursive function to print first N terms of Fibonacci series

### Program -

```

#include <stdio.h>

void fibonacci(int,int,int);

int main()
{
    int N;

    printf("Enter the value of N: ");
    scanf("%d",&N);
    printf("First %d terms of fibonacci series is\n",N);
    fibonacci(N,-1,1);

    return 0;
}

void fibonacci(int n , int a , int b)
{
    int c;
    if(n > 0)
    {
        c = a + b;
        printf("%d ",c);
        a = b;
        b = c;
        fibonacci(n-1,a,b);
    }
}

```

**Output -**

Enter the value of N: 10  
First 10 terms of fibonacci series is  
0 1 1 2 3 5 8 13 21 34

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**9. Write a program in C to count the digits of a given number using recursion.****Program -**

```
#include <stdio.h>

int count(int,int);

int main()
{
    int N;

    printf("Enter a number: ");
    scanf("%d",&N);

    printf("Number of digits in %d is %d",N,count((N),0));

    return 0;
}

int count(int n , int c)
{
    if(n > 0)
    {
        c++;
        return count(n/10,c);
    }
}
```

**Output -**

Enter a number: 77201  
Number of digits in 77201 is 5

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**10. Write a program in C to calculate the power of any number using recursion.****Program -**

```
#include<stdio.h>

int main()
{
    int n , p;
    printf("Enter a number: ");
    scanf("%d",&n);
    printf("Enter power of the number: ");
```

```
scanf("%d",&p);

printf("%d to the power %d = %d",n,p,power(n,p));
return 0;
}

int power(int a , int N)
{
    if(N == 0)
        return 1;
    return a * power(a , N - 1);
}
```

**Output -**

Enter a number: 7

Enter power of the number: 3

7 to the power 3 = 343