

## Lab 2

### COSC2006001L3(LAB) – Data Structure I

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#### Part 1: Factorial of a Number

##### Problem Statement:

Write a program to calculate the factorial of a number using recursion. The factorial of a number  $n$  is the product of all positive integers less than or equal to  $n$  (e.g.,  $\text{factorial}(5) = 5 * 4 * 3 * 2 * 1$ ).

##### Instructions:

- Write a recursive function `factorial(int n)` that calculates the factorial of a number.
- Include a base case (`factorial(0) = 1`) and a recursive case (`factorial(n) = n * factorial(n-1)`).
- Add print statements to trace the function's execution and test the function with `factorial(5)`.

Code:

```
public class Factorial
{
    public static void main(String[] args)
    {
        System.out.println("The factorial of 5 is: "+factorial(5));
    }

    //created the function to calculate the factorial using recursive
    public static int factorial(int n)
    {
        if(n==0)
            return 1;
        return factorial(n-1)*n;//used recursive method
    }
}
```

Output:

```
The factorial of 5 is: 120
PS C:\Users\nitis\DS Lab\DS Lab1\DS Lab#1>
```

## Part 2: Sum of Numbers from 1 to N

### Problem Statement:

Write a program to calculate the sum of all numbers from 1 to n using recursion. For example, the sum of numbers from 1 to 5 is  $1 + 2 + 3 + 4 + 5 = 15$ .

### Instructions:

- Write a recursive function `sum(int n)` that calculates the sum of numbers from 1 to n.
- Include a base case ( $\text{sum}(1) = 1$ ) and a recursive case ( $\text{sum}(n) = n + \text{sum}(n-1)$ ).
- Add print statements to trace the function's execution and test the function with `sum(5)`.

Code:

```
public class Sum
```

```
{
```

```
    public static void main(String[] args)
```

```
    {
```

```
        System.out.println("The sum form 1 to 5 is: "+sum(5));
```

```
    }
```

```
//created the function to calculate the sum of sequence of numbers using recursive
```

```
public static int sum(int n)
```

```
{
```

```
    if(n==1)
```

```
        return 1;
```

```
        return sum(n-1)+n;//used recursive method
```

```
    }
```

```
}
```

Output:

```
The sum form 1 to 5 is: 15  
PS C:\Users\nitis\DS Lab\DS Lab1\DS Lab#1>
```

Thank you...