National University of Computer & Emerging Sciences (NUCES) Islamabad,
Department of Computer Science

DATA STRUCTURES – FALL 2021

LAB 10

Learning Outcomes

In this laboratory, you will implement the concept of Recursion.

Practice

```
int sum(int n) {
    if (n != 0)
        return n + sum(n - 1);
    else
        return n;
}
```

What does sum(4) function call returns?

```
int task(int a, int b)
{
    if (b == 0)
        return 0;
    if (b % 2 == 0)
        return task(a + a, b/2);

    return task(a + a, b/2) + a;
}
```

What does task(4,3) function call return?

```
int task(int a, int b)
{
   if (b == 0)
       return 1;
   if (b % 2 == 0)
```

```
    return task(a*a, b/2);

  return task(a*a, b/2)*a;
}
```

What does task(4,3) function call returns?

Recursive function generally divides the problem into simpler sub-problems.

TASK 1

Write a recursive function that calculates the greatest common divisor (GCD) of a given number.

The **GCD** of two numbers is the largest number that divides them both. For example:

30: 1,2,3,5,6,10,15,30
24: 1,2,4,6,12,24

GCD=6

TASK 2

Write a recursive function to reverse a string without reversing the characters of words in string. Example: “cat is running” becomes “running is cat”.

TASK 3

A word is considered **elfish** if it contains the
letters: **e**, **l**, and **f** in it, in any order. For example, we would say that the following words are elfish: whiteleaf, tasteful, unfriendly, and waffles, because they each contain those letters.

Write a recursive function that, given a word, tells us if that word is elfish or not.