

## 5. Lab 5: Recursion

### 5.1. Objectives

Apply Recursion in practical mathematical problems.

### 5.2. Problems

#### 5.3. Problem 1: Use the following function puzzle(..) to answer problems 1 - 3.

```
int puzzle(int base, int limit)
{
    //base and limit are nonnegative numbers
    if ( base > limit )
        return -1;
    else if ( base == limit )
        return 1;
    else
        return base * puzzle(base + 1, limit);
}
```

1. (10 points) Identify the base case(s) of function puzzle(..)
2. (10 points) Identify the recursive case(s) of function puzzle(..)
3. (10 points) Show what would be displayed by the following calls.
  - a. `System.out.print(puzzle(14,10));`
  - b. `System.out.print(puzzle(4,7));`
  - c. `System.out.print(puzzle(0,0));`

#### 5.4. Problem 3: Write a recursive function that computes the sum of all numbers from 1 to n, where n is given as a parameter.

```
//return the sum 1+ 2+ 3+ ...+ n
int sum(int n)
```

#### 5.5. Problem 5: Write a recursive function that computes and returns the sum of all elements in an array, where the array and its size are given as parameters.

```
//return the sum of all elements in a[]
int findsum(int a[], int n)
```

#### 5.6. Problem 7: Write a recursive function that takes a string as input and reverses it using recursion.

#### 5.7. Problem 8: Write a recursive function to generate all subsets of a given set.

## 5.8. Problem 11: Use recursion to generate a Von Koch snowflake

[https://en.wikipedia.org/wiki/Koch\\_snowflake](https://en.wikipedia.org/wiki/Koch_snowflake)

