

# Lab Assignment 3

CS 301 – Data Structures

For this assignment you are given 5 different recursive functions. You have to analyze each of the functions and figure out what they do. For each already implemented recursive function, there is an iterative function (method) which needs to be implemented. This assignment can be broken down into two parts, details for each part can be seen below.

## Part 1

Analyze each of the recursive functions by stepping through them on paper. You need to build a call stack, in-order to properly step through the algorithm on paper. There are many different examples on how to build the call stack in the lecture slides, refer to them for hints/help. You must show your steps for at-least **two different inputs for each function**. See the document named *Function Analysis*, for a sample step through the recursive function named *recSample*.

## Part 2

Implement each of the iterative functions in the file *LabAssingment3.java*. The function named *itrFunc1* takes in the same input as the function named *recFunc1*, and needs to have the same output. Essentially you are given a recursive function, and you must implement it iteratively. In order to do this correctly, you need to understand what the recursive function does. It is recommended that you first complete *Part 1* of the assignment, then implement the iterative solution for each function. In the Java file provided, you can see how *itrSample* is implemented. It solves the same problem as *recSample* function, without using recursion.

## Implementation

You are given a file *LabAssingment3.java* (which you can download from canvas). The file contains a class *LabAssingment3* with a couple functions named *recFunc1*, *itrFunc1*, *recFunc2*, *itrFunc2*, and so on. Implement the all of the iterative functions (*itrFunc1*, *itrFunc2*, ... , etc.). **Do not make any changes outside of these two functions (e. g. by adding helper functions); such changes will be undone.** Do not output anything to the terminal.

The program already implemented in the file *LabAssingment3java* randomly generates test cases. This file contains a small number of test cases. Note that the purpose of the tests is for you to avoid major mistakes. **Passing all given tests does not imply that your algorithm is correct, especially that is has the expected runtime.**

## Submission

For your submission, upload the file *LabAssingment3.java* with your implementation to canvas. This is an individual assignment. Therefore, a submission is required from each student.

**Deadline:** On Canvas.