**Lab Assignment #3 – Using Recursion**

Due Date: Friday, Week 6

Purpose: The purpose of this Lab assignment is to:

1. Design recursive algorithms
2. Implement recursive methods in Java or Python

References: Read the course’s text chapter 5 and the lecture slides. This material provides the necessary information that you need to complete the exercises.

Be sure to read the following general instructions carefully:

- This assignment must be completed individually by all the students.

- You will have to **demonstrate your solution in a scheduled lab session** and upload the solution on **eCentennial** through the assignment link.

**Exercise 1**

Create a **recursive algorithm** to compute the **product of two positive integers**, *m* and *n*, using only addition and subtraction. Implement the Java or Python code. **Hint:** You need subtraction to count down from *m* or *n* and addition to do the arithmetic needed to get the right answer. Check linearSum method from Week 5 examples.

(2 marks)

**Exercise 2**

Write a short **recursive Java method** that determines if a string s is a palindrome, that is, it is equal to its reverse. Examples of palindromes include 'racecar' and 'gohangasalamiimalasagnahog'. Test the method by asking the user to provide string entries to be checked. **Hint:** Check the equality of the first and last characters and recur (but be careful to return the correct value for both odd and even-length strings).

(3 marks)

**Exercise 3**

Implement a **recursive method** with calling signature *find(path, filename)* that reports all entries of the file system rooted at the given path having the given file name. Test the method with a real path, filename from your file system. **Hint**: Review use of the java.io.File class and the week 5 examples.

(5 marks)

**Evaluation:**

|  |  |
| --- | --- |
| **Correct implementation of requirements:**   * Correct recursive algorithm * Correct Java or Python implementation * Explanation of algorithm | 90% |
| **Friendly I/O** | 10% |
| **Total** | 100% |

You must name your Eclipse project according to the following rule:

**YourFullname\_COMP254Labnumber\_Exercisenumber**.

Example: **JohnSmith\_ COMP254Lab3\_Ex1**

**Submission rules:**

Submit your modules as **zip files** that are named according to the following rule:

**YourFullname\_ COMP254Labnumber\_Exercisenumber.zip**

Example: **JohnSmith\_ COMP254Lab3\_Ex1.zip**

Use 7-zip to compress files (https://www.7-zip.org/download.html).