**King Fahd University of Petroleum & Minerals**

**College of Computer Science and Engineering**

**Information and Computer Science Department**

**ICS 202 – Data Structures**

# Recursion

**Objectives**

The objective of this lab is to design, and implement recursive programs.

**Outcomes**

After completing this Lab, students are expected to:

• Design recursive solutions.

• Implement recursive methods.

**Lab Exercises**

1. Given an array of strings, write a recursive method that finds and prints the string of (a) minimum length and (b) another recursive method that finds the string of maximum length.

Your methods should have signature as follows:

1. public static String findSmallest(String[] array, int index)
2. public static String findLongest(String[] array, int index)

For example, if the array is {“apple”, “mango”, “banana”, “nut”, “watermelon”}

then findSmallest method will return “nut”, while findLongest will return “watermelon”.

**Also write a main method to test your methods.**

1. Write a recursive method GCD(*n*, *m*) that returns the greatest common divisor of two integers *n* and *m* according to the following:

GCD(*n*, *m*) = *n*, if *m* = 0

= GCD(*m*, *n* mod *m*) otherwise

**Also write a main method to test your method.**

1. Write a recursive method putCommas(int x) that puts commas after every 3 digits in an integer “x” starting from the units place. The method is public static String putCommas(int x)

For example, putCommas(1234567) returns 1,234,567.

**Also write a main method to test your method.**

1. Write a recursive method findPalindrome(SLL<T> list) that finds whether the contents of a singly linked list form a palindrome. The algorithm is as follows:
   1. Base Case: If the list is empty or has one element, return true.
   2. Recursive Case: If the head and tail have the same contents, apply findPalindrome on a new, shorter list without the head and tail of the original list; if the head and tail do not have the same contents, return false.

**Also write a main method to test your method.**