CS 610 – 104 Homework 4 Spring 2017

Note: All homework assignments are to be completed individually. **No group work is allowed.** This homework is due at the beginning of class on the assigned due date. To receive any credit for your submission **you must show all work**.

1.) **(5 pts) Using the abstract operations defined for the List ADT, write an algorithm to count the number of elements that fall between a range of [low, high] inclusive in an unsorted List ADT S.**

2.) **(5pts) Using the abstract operations defined for the Tree ADT, write an abstract level pseudocode algorithm CountExternal(T, v) to count the number of external nodes in a Tree T.**

3.) **(5 pts) Assume that a Tree ADT stores numerical values. Write an algorithm TreeMax(T, v, max) that returns the largest value in a Tree ADT T.**

4.) **(5 pts) Using the abstract operations defined for the Tree ADT, write an algorithm isTernaryTree(T, v), which returns a Boolean value indicating if the Tree ADT T is a proper ternary tree. A proper ternary tree is a tree where each node has three children or no children.**

5.) **(5 pts) Using the abstract operations defined for the Binary Tree ADT, write an algorithm cousins(T, v) that returns the cousins (i.e., nodes with the same grandparent) of a given node v in a proper binary tree ADT T, if they exist. The cousins can be returned as an array.**

6.) **(10 pts) Using the abstract operations defined for the Binary Tree ADT, write an algorithm to determines if two Binary Trees, T1 and T2, are equal. A binary tree is considered equal if the structure is the same and the values stored at the same location in the trees are the same.**

For (2)-(6) analyze the order if the running time if the Tree/Binary Tree is implemented using a linked-node data structure where each node has a direct link to its children and (i) has a link to its parent and (ii) does not have a link to its parent.