

CPSC 3200: Algorithm Analysis and Advanced Data Structure

Summer 2013

Home Assignment 4

Question #1: (Programming)

Implement the following methods in the Binary Tree class:

- **height(root)** method that will return the height of the binary search tree.
- **search(element)** method that performs the binary search for a specific element in the Binary Search Tree.
- **inOrder(root)** method to print the elements in the tree in an inOrder sequence. Do not use recursion.
- **preorder(root)** method to print the elements in the tree in an inOrder sequence. Use recursion.
- **delete(v)** method that will delete a specific element in the tree.
- **internalCounter(root)** method that returns the number of internal nodes in the binary search tree.

Write a BinaryTreeTester class to test your code by creating a Binary Search Tree.

- Ask the user to enter 10 integer elements.
- Print the **size** of the tree.
- Print the **height** of the tree.
- Print the tree's elements in "**inOrder**" sequence.
- Print the tree's elements in "**preOrder**" sequence.
- Ask the user for an element to be deleted from the tree, then use the **delete** method to delete that element.
- Print the number of internal nodes in the tree using the **internalCounter** method.

Question #2:

Draw a (single) binary tree such that:

- Each internal node stores a single character
- A *preorder* traversal yields EXAMFUN
- An *inorder* traversal yields MAFXUEN

Question #3:

What is the output and the priority queue status after executing the following sequence of priority queue ADT methods: insert(5, A), insert(4, B), insert(7, I), insert(1, D), removeMin(), insert(3, J), insert(6, L), removeMin(), removeMin(), insert(8, G), removeMin(), insert(2, H), removeMin(), removeMin()?

Question #4:

- A. Illustrate the execution of the **selection-sort** algorithm on the following input sequence: (22, 15, 36, 44, 10, 3, 9, 13, 29, 25)
- B. Illustrate the execution of the **insertion sort** algorithm on the input sequence: (22, 15, 36, 44, 10, 3, 9, 13, 29, 25)
- C. Illustrate the execution of the **heap-sort** algorithm on the following input sequence: (22, 15, 36, 44, 10, 3, 9, 13, 29, 25)

Grading system for each question.

Description
Class name
Comments for the "author" – FirstName, LastName
Comments for the program description
Code and code comments following the Javadoc style