CSIS-10B PRACTICE FINAL EXAM

Closed Computer and Book
1 Double-sided sheet of notes allowed – staple to your test when done

Part I: Written Portion (70 Points)

All questions, unless noted, are worth 10 points each.

1) Suppose that nameList is a list that contains the following strings: *Kyle, Cathy, Sam, Austin, Sara.* What output is produced by the following sequence of statements?

```
Iterator<String> nameIterator = nameList.getIterator();
System.out.println(nameIterator.next());
nameIterator.remove();
nameIterator.next();
System.out.println(nameIterator.next());
nameIterator.remove();
nameIterator.next();
System.out.println(nameIterator.next());
System.out.println("the modified list: ");
displayList(nameList);
```

2) Suppose we have an unsorted array of Student objects:

```
Student[]  unsorted = new Student[1000];
```

a) What would be the advantages of putting them into a `SortedArrayDictionary`, using the `Student` ID field as the Key?

b) If the Student class consists of

```
public class Student implements Comparable<Student>
{
   private String firstName, lastName;
   private double GPA;
   private int ID;

… and appropriately written set, get and compareTo methods…
}
```

Write a statement that creates a SortedArrayDictionary of 1000 ID/Student entries

c) Write statements that add the contents of array `unsorted` to the Dictionary you created in b)

3) Suppose an object hashes to cell index 7 in an 11 cell table. List the next 4 cell indices that will be examined (if there are collisions), using

   a) Linear Probing

   b) Quadratic Probing

4) draw the data structure you get when inserting the values "e" "a" "d" "g" "c" into:

   a) a binary search tree

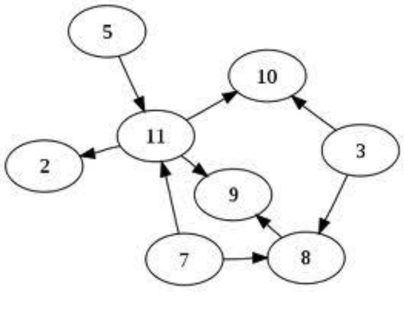
   b) a max heap

5) Here is a small binary tree:

```
     B
   /   \
  I     T
   \   / \
   N R    E
         /
        E
```

Write the order of the nodes visited in:
A. An in-order traversal:
B. A pre-order traversal:
C. A post-order traversal:

6) In the graph below, show the Vertices visited while performing a



a. Breadth-first traversal starting at Vertex 7

b. Depth-first traversal starting at Vertex 7

c. Represent the graph with an adjacency matrix

7) Suppose we discover a mysterious pair of methods in the simple BST class from Lab 12:

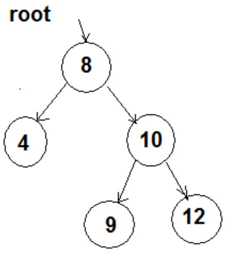
```
public void mystery()
{
   mysteryAux(root);
}

private void mysteryAux(TreeNode subNode)
{
   if (subNode != null)
   {
         TreeNode temp = subNode.left;
         subNode.left = subNode.right;
         subNode.right = temp;
         mysteryAux( subNode.left);
         mysteryAux( subNode.right);
   }
}
```

a) Show what happens to the following tree AFTER we invoke the mystery() method on it:

BEFORE

AFTER



b) Does it still obey the BST property?

CSIS-10B FINAL EXAM PART 2 (30 Points)

The actual exam will not allow access to a computer. You will have to write all code on paper. See the description of the final exam on the main course delivery system (mpconline).

www.tomrebold.com/csis10b/SimpleBST.zip to your desktop.

8) (30 points) Open the project in BlueJ or Eclipse and run the code in the BSTmainApp class. You'll notice it generates the familiar tree from lab 12. Now, make the following changes to the project:

A) In class Student define a compareTo method that compares Students by ID

B) create new classes StuBST, and StuTreeNode. Then copy the code from BST and TreeNode into these classes and modify them so that they store Student objects instead of Strings. Then activate the code and add more code to create a tree of Student data.

C) Create an iterator for the `student` tree and use it to print all the Student last names in the tree (print only the last names)

D) Extra Credit (5 points): Convert the BST and TreeNode classes to be completely generic and modify the code for B to use these generic tree classes.

E) Extra Credit (5 points): Read the entire file StudentA.txt into the BST you created above

Add your name to the top of each file in the project.

When you are finished, make a jar of the project folder and upload it to the server. Print out the uploader response page with your code on it, staple and turn in.