Laboratory 9: Cover Sheet

Name: Ernest Landrito Date: October 30, 2013

Section: 1

Place a check mark in the *Assigned* column next to the exercises your instructor has assigned to you. Attach this cover sheet to the front of the packet of materials you submit following the laboratory.

Activities	**Assigned:** Check or list exercise numbers	**Completed**
Implementation Testing	✓	
Programming Exercise 1	✓	
Programming Exercise 2	✓	
Programming Exercise 3		
Analysis Exercise 1	✓	
Analysis Exercise 2	✓	
	Total	

Laboratory 9: Implementation Testing

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Check with your instructor whether you are to complete this exercise prior to your lab period or during lab.

Test Plan 9-1 (Binary Search Tree ADT operations)			
Test case	**Commands**	**Expected result**	**Checked**
Balanced Tree	+2+3+1	2 with nodes 1 and 3	
Unbalanced tree	+1+2+3	1 with node 2 with node 3	

Laboratory 9: Programming Exercise 1

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Test Plan 9-2 (accounts database indexing program)		
Test case	**Expected result**	**Checked**
1144	1144 Donald Williams 4114.26	
0	No Record	

Laboratory 9: Programming Exercise 2

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Test Plan 9-3 (getCount operation)			
Test case	**Commands**	**Expected result**	**Checked**
Height of 3	+1 +2 +3 H	3	
Height of 0	H	0	
Height of 2	+2 +3 +1 H	2	

Test Plan 9-4 (getHeight operation)			
Test case	**Commands**	**Expected result**	**Checked**
Height of 4	+3+2+1+0+6+4+5H	4	
Height of 0	H	0	
Height of 1	+1 H	1	

Laboratory 9: Programming Exercise 3

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Test Plan 9-5 (writeLessThan operation)			
Test case	**Commands**	**Expected result**	**Checked**

Laboratory 9: Analysis Exercise 1

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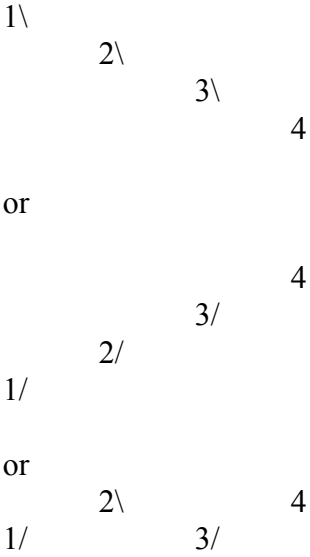
What are the heights of the shortest and tallest binary search trees that can be constructed from a set of *N* distinct keys? Give examples that illustrate your answer.

The max height of a BST of N distinct keys is N. This can be shown in a tree with 4 nodes



or

or

There is no combination in the tree that will make the tree larger than N.

Laboratory 9: Analysis Exercise 2

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Given the shortest possible binary search tree containing *N* distinct keys, develop worst-case, order-of-magnitude estimates of the execution time of the following Binary Search Tree ADT operations. Briefly explain your reasoning behind each of your estimates.

retrieve O(log2(n))

Explanation: the worst case scenario is if the key is not in the list and the function has to traverse to the end and since it is a binary tree it will take log2(n) to get to the bottom

insert O(log2(n))

Explanation: this function only inserts at leaf location so it must traverse the tree to get to the bottom of the tree before it inserts thus making it be of order log2(n)

remove O(log2(n))

Explanation: This is a log2(n) function because if it traverses to the end of the list then it can just remove the item. If it doesn't traverse to the end of the tree, it has to traverse the tree one more time to switch then remove a node. Thus making it at most 2log2(n) which simplifies to be of order log2(n).

writeKeys O(n)

Explanation: The function just has to go through every node of the tree once thus making it linear.