COP 4530 Term Exam 5
Fall 2001
Professor Chris Lacher

Name: _____
SSN: _____
CS Username: _____
Score: _____ /100

This test contains 3 questions (10 subquestions) on 2 pages. Each subquestion is worth 10 points.

1. You are given the declarations:

```
TBinaryTree <int>                       bt;
TBinaryTreeInorderIterator <int>        I;
```

a. What loop defines an inorder traversal of `bt`?

Define an *edge move* to be a call to any of the following `TBinaryTree<>::Navigator` operations: `Initialize(), ++(), ++(int), --(),` or `--(int).`

b. For the `bt = tree1` illustrated, show the number of edge moves for each step in an inorder traversal (insert as many rows as necessary to complete the traversal):

step	no. of edge moves	`tree1`

```
I.Initialize(tree1);
++I;
++I;
```

c. What, for a general `bt`, should the sum of all these edge moves be?

d. What does this calculation illustrate about the computational cost of the iterator increment operator `TBinaryTreeInorderIterator<>::++()`?

2. Suppose that you want to save a binary search tree to file and later reconstruct the tree exactly using `TBinarySearchTree::Insert(const T& t)`.

   a. How would you save the file?

   b. Why does your method of saving result in correct reconstruction of the tree?

3. An implementation of binary search tree uses a predicate object `LessThan` on elements to structure the tree according to a certain order property.

   a. *Name* the order property used to define a binary search tree.

   b. *Define* the order property used to define a binary search tree.

   c. Given the binary search tree **`tree2`** illustrated, trace the path of the search for the element 15:

   d. Given the binary search tree **`tree3`** illustrated, trace the path of the search for the element 25: