

Quiz 4
25 points possible

1. (10.5 pts) Give the Big-Oh running times for the following operations:

- a) Insert into a 2-3 tree
- b) Insert into a Red-Black Tree
- c) Insert into a hash table using separate chaining
- d) Searching for an item in a hash table using double hashing (Best case)
- e) Finding the inorder successor of a node in a 2-3 tree
- f) Right rotate operation on the root of a red-black tree
- g) Rehashing the items in a hash table to a new hash table that is twice the size using quadratic probing

2. (4.5 pts) Briefly define the following:

- a) Open address hashing
- b) Black height of a node
- c) Secondary clustering

3. (5 pts) Given the following values: 1, 2, 3, 4, 5, 6, and 7: (Note, you do not have to insert these values one a time into the trees, just draw a tree containing the values)

a) Draw a valid red-black tree containing the above values

b) Draw a valid 2-3 tree containing the above values

4. (5 pts) Write code to find and return the node containing the inorder successor of an item in a 2-3 tree. You may assume that you are finding the inorder successor of an item in an internal node (just like for the remove operation) although make sure to provide good error checking throughout. You may write and call additional functions but make sure you start with the following function:

```
// cur is the node containing item.  
// You may assume <, > and == have been overloaded for itemtype  
Node*  
Tree::findInorderSuccessor ( Node* cur, itemtype item ) {
```