CS380 Algorithm Design & Analysis
Assignment 4: Red Black trees and performance measurement
Date Assigned: October 23 & 25, in class.

Total Points: 30 pts

TEAMS:
Group1: Thomas, Alec, Ahmed
Group2: Liam, Kai
Group3: Chris, Ryan
Group4: Andrew, Siva, Nick
Group5: Ashleigh, Troy, Haymond

For this project you will implement rbInsert(), rbDelete(), leftRotate(), rightRotate(), insertFixup(), and deleteFixup() and any necessary helper functions you need. You will download a starter project from Subversion and work with a partner on this project in the CS Lab.

► Work on RBInsert first. Get that completely working before you start on RBDelete. The deletion portion of the driver is commented out.

►At the end of class Wednesday, send Chadd an email detailing which methods you have completed.

The driver is already written for you. That driver will collect performance data when reading 9,000,000 random mountains and then searching for each mountain, and then deleting each mountain.

1. Number of left rotations (for insert and for delete, separately)
2. Number of right rotations (for insert and for delete, separately)
3. Wall clock time for inserting all items
4. Wall clock time for searching for all items
5. Wall clock time for deleting all items
6. Average depth of an item found
7. Max depth of an item found

The data is available in mountainsLargeDistinct.txt

OUTPUT – COMPLETELY FAKE!

```
AVG   DEPTH: 1.1
MAX   DEPTH: 2
Insert
        RIGHT ROTATE: 50
        LEFT  ROTATE: 40
Delete
        RIGHT ROTATE: 52
        LEFT  ROTATE: 39
LOAD       TIME: 1.704
SEARCH   TIME: 0.336
DELETE    TIME: 2.851
```

What to Submit

I will pull your project out of Subversion. You must provide me with a color, double sided hard copy of

RedBlackTree .h/.cpp

A print out of your output

Your code must build without any warnings. You must follow the C++ coding standards. Check for memory leaks!

Get the files at:

svn+ssh://punetid@svnzeus/home/CS380/Group#_SVNROOT/CS380_RedBlackTree_Student

Be sure to do all of you timing via "Run without debugging" and without memory debugging.

Add your data to the class spreadsheet on GoogleDocs.