CS 311 Data Structures and Algorithms

Assignment 4

Due on Wednesday, April 13, 11:59PM.

Binary Search Tree

[85 Points] Write a C++ program to implement a Binary Search Tree (BST). Your program must be able to read a list of integers (separated by space) from keyboard input and create a BST (e.g., by inserting these numbers into the BST one by one). At the end, please print the BST that you have created using the last function below. The node structure of your BST is as follows.

```
struct Node{
   int data;
   Node * LC;
   Node * RC;
};
```

Your program must implement the following BST operations.

1. Tree Traversal (print out the keys)
   a. Pre-order.
   b. In-order.
   c. Post-order.
2. Searching

Node* search(int key): Search the BST. Return a pointer to a node with *key* if one exists; otherwise, it returns NULL.

3. Insertion

void insert(int data): Insert *data* into the BST. The updated tree remains a BST.

4. Deletion

void remove(int key): Delete the node with *key* from the BST if one exists. The updated tree remains a BST.

5. Display

void print(Node * root): Print the tree (in the shape of a tree) from the root node.

[15 Points] Upgrade your Insertion and Deletion functions above to convert your program into a self-balancing BST.

Submit the code to Cougar Course.