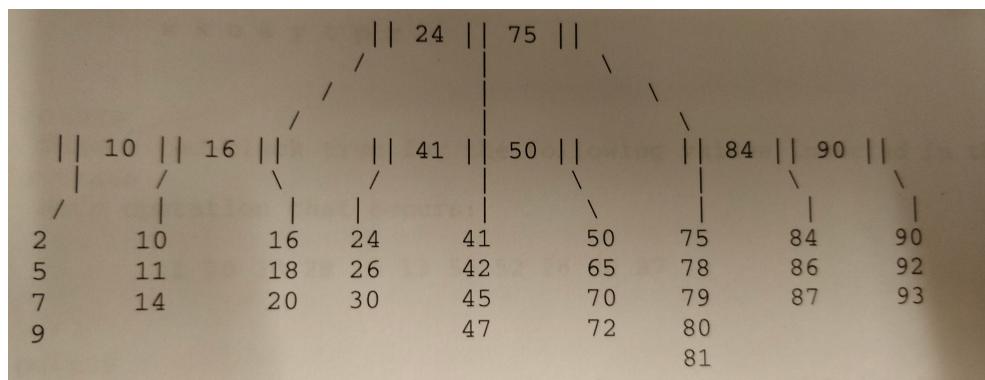


Homework 2

Due Date: March 5, 2019

- (1) **(15 pts)** What is the largest possible height of an AVL tree with 20 nodes?
- (2) **(15 pts)** What is the minimum number of nodes in an AVL tree of height 10?
- (3) **(10 pts)** Show the result of inserting the following sequence of keys into an initially empty AVL tree: 15, 10, 11, 16, 12, 30, 18, 20, 19, 17.
- (4) **(10 pts)** For a B+ Tree where M=3 and L=5 shown below, show how an insert of 77 is handled. *Use the method of splitting vs redistributing*



- (5) **(50 pts)** Given this skeleton a Node and a Red Black Tree

```
class Node{  
    Node left;  
    Node right;  
    Node parent;  
    int value;  
    String color;  
    Node(int value, String color);  
}  
class RedBlackTree {  
    Node root;  
    RedBlackTree();  
    void insert(int v);  
    void remove(int v);  
}
```

Write the methods for insertion and deletion. These methods will require helper methods to handle the different cases for balancing the tree if the new insertion or deletion unbalances the tree. *You will have to write code for these methods*
