

# 15-211: Assignment 3 Theory Questions

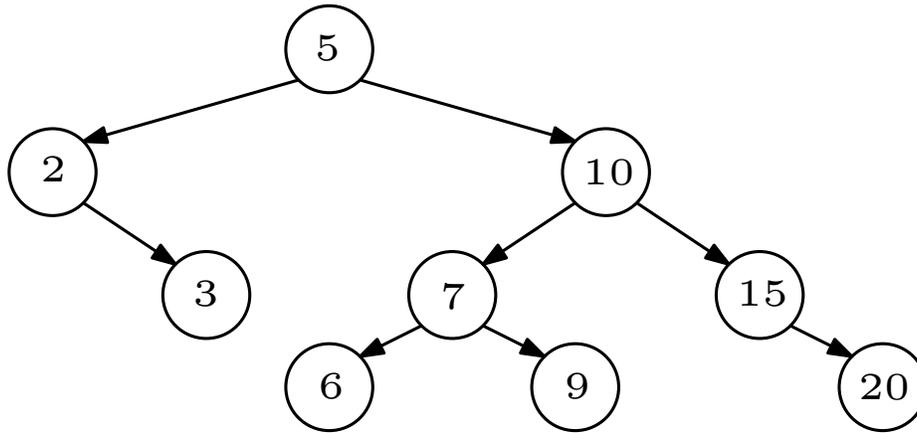
Due July 20, 2009 in class

Name: \_\_\_\_\_

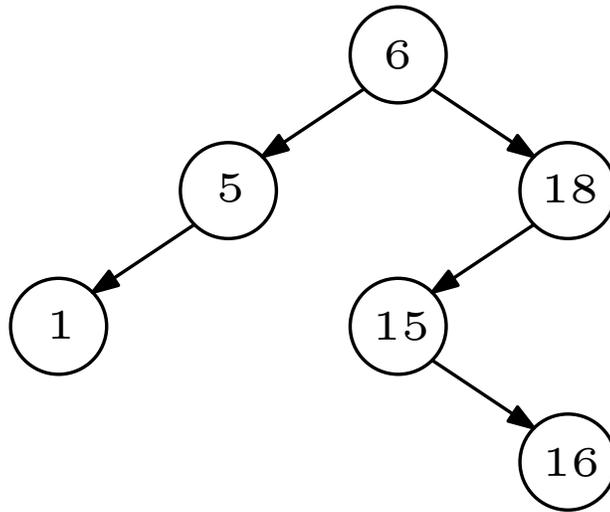
Andrew ID: \_\_\_\_\_

These questions count for 15% of the homework grade. Please hand in your answers, written or typeset, in lecture on Friday.

- (3) 1. Insert 8 into the AVL tree below. Draw the tree after each single rotation.



- (3) 2. In the following tree splay on node 16. Show all intermediate trees. Double rotations zig-zig and zig-zag count as one step.



3. Fred Hacker wants to create a trie for shorts. A short is 16 bits long, so it can take on  $2^{16} = 65536$  different values. Fred has decided that upon creating a new node, he will just have an array of 65536 pointers initialized to null.

(3) (a) What are the advantages and/or disadvantages of Freds trie?

(2) (b) Make one *small* change to Freds design that will make a **BIG** change in the amount of memory used.

(4) 4. The buildHeap operation takes an array (or a complete binary tree) and turns it into a min-heap. Apply buildHeap operation to the following set of data. Show all intermediate steps (after each percolation) using the array structure.

0	1	2	3	4	5	6	7	8	9
	67	43	23	99	13	40	39	84	101