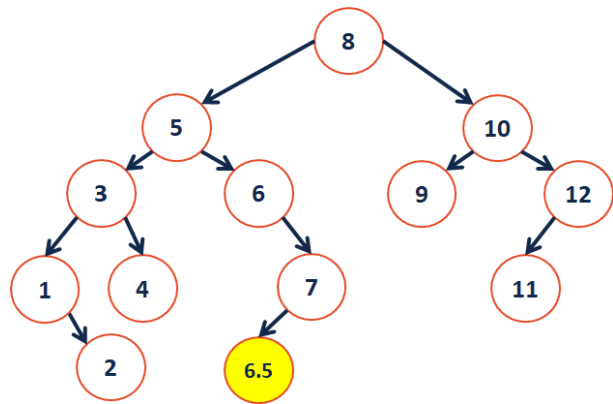
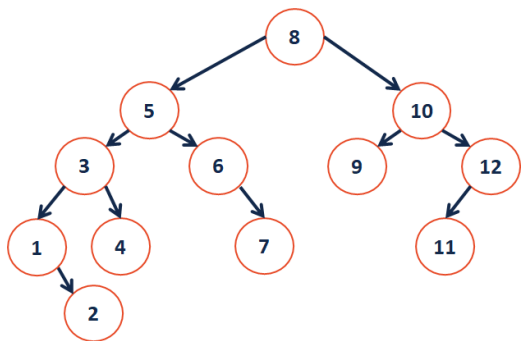


AVL Insertion



AVL Removal



Running Times:

	AVL Tree
find	
insert	
remove	

Motivation:

Big-O is defined as:

Let  $f(n)$  describe the height of an AVL tree in terms of the number of nodes in the tree ( $n$ ). Visually, we can represent the big-O relation:



$f(n) \leq c \times g(n)$ : Provides an upper bound:

The height of the tree,  $f(n)$ , will always be less than  $c \times g(n)$  for all values where  $n > k$ .

$f^{-1}(h) \geq c \times g^{-1}(h)$ : Provides a lower bound:

The number of nodes in the tree,  $f^{-1}(h)$ , will always be greater than  $c \times g^{-1}(h)$  for all values where  $n > k$ .

**Plan of Action:**

Goal: Find a function that defines the lower bound on **n** given **h**.

Given the goal, we begin by defining a function that describes the smallest number of nodes in an AVL of height **h**:

**Theorem:**

An AVL tree of height **h** has at least \_\_\_\_\_.

**I.** Consider an AVL tree and let **h** denote its height.

**II.** Case: \_\_\_\_\_

**III.** Case: \_\_\_\_\_

**IV.** Case: \_\_\_\_\_

Inductive hypothesis (IH):

Proving our IH:

**V.** Using a proof by induction, we have shown that:

...and by inverting our finding:

**Summary of Balanced BSTs:**

Advantages	Disadvantages

CS 225 – Things To Be Doing:
<ol style="list-style-type: none"> <li>1. Quiz 5 is ongoing!</li> <li>2. mp_traversals extra credit submission ongoing – due Monday!</li> <li>3. lab_huffman is due on Sunday</li> <li>4. Daily POTDs are ongoing!</li> </ol>