Announcements

- HW 7 due Monday
  - check code if confused

- Next HW - delete in BST
can work w/ partner
due in 1 week
AVL Trees: balanced BST

Height - Balance Property:
For every node of T, the heights of the children differ by at most 1.

⇒ max height ≤ 2\lceil \log_{2} n \rceil

(How do we calculate height again?)
Ex: 

```
44
 /    \
/     /\    
17    78
  |    |
 32    66
  |    |
40    62
```
Now: How can we mess this up?

(In other words, how can the height change?)

- Insert
- Delete
Insert:
insert(54)

Fix lowest problem node.
So: consider the lowest node which does not satisfy the height-balance property \( v \) — call this \( z \).

Let \( y \) be \( z \)'s child with larger height.

Let \( x \) be \( y \)'s child with larger \( y \)'s height.

Now — fix it!
What did you do?
Another - insert (4,9)
So: consider the lowest node which does not satisfy height-balance property - call this

Let $x$ be $t$'s child with larger height.

Let $x$ be $y$'s child with larger height.

Now - fix it!
What did you do?
Generalize - Consider $x, y, z, \bar{z}$. How can we restructure?

(Hint: What is inorder traversal of these in each case?)
Actual picture:

Where do the subtrees go??
Another
Any way you do this, "2" becomes the root of the new subtree with "1" to the left and "3" to the right.

What about T1, T2, T3, & T4?

Hang left to right