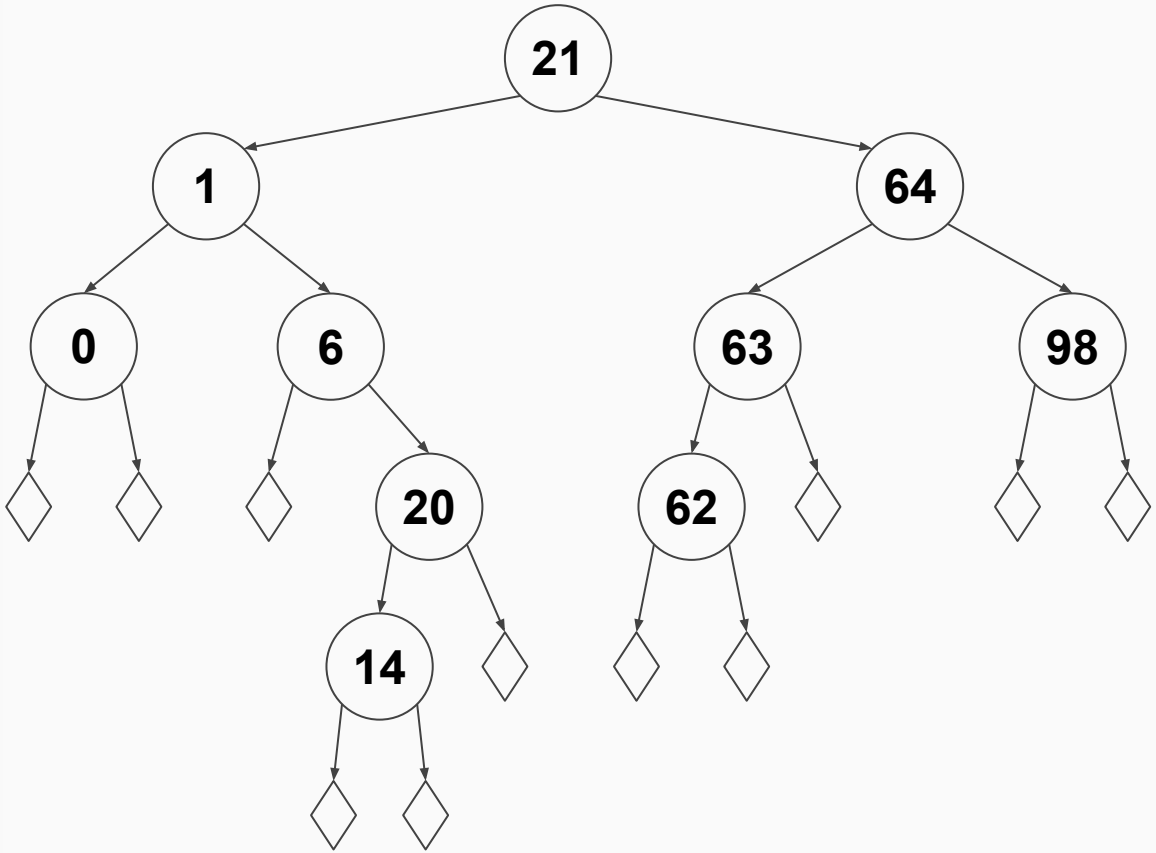
CSE 250 Recitation

4/9: Balance Binary Search Trees, Midterm Review

Balanced Trees

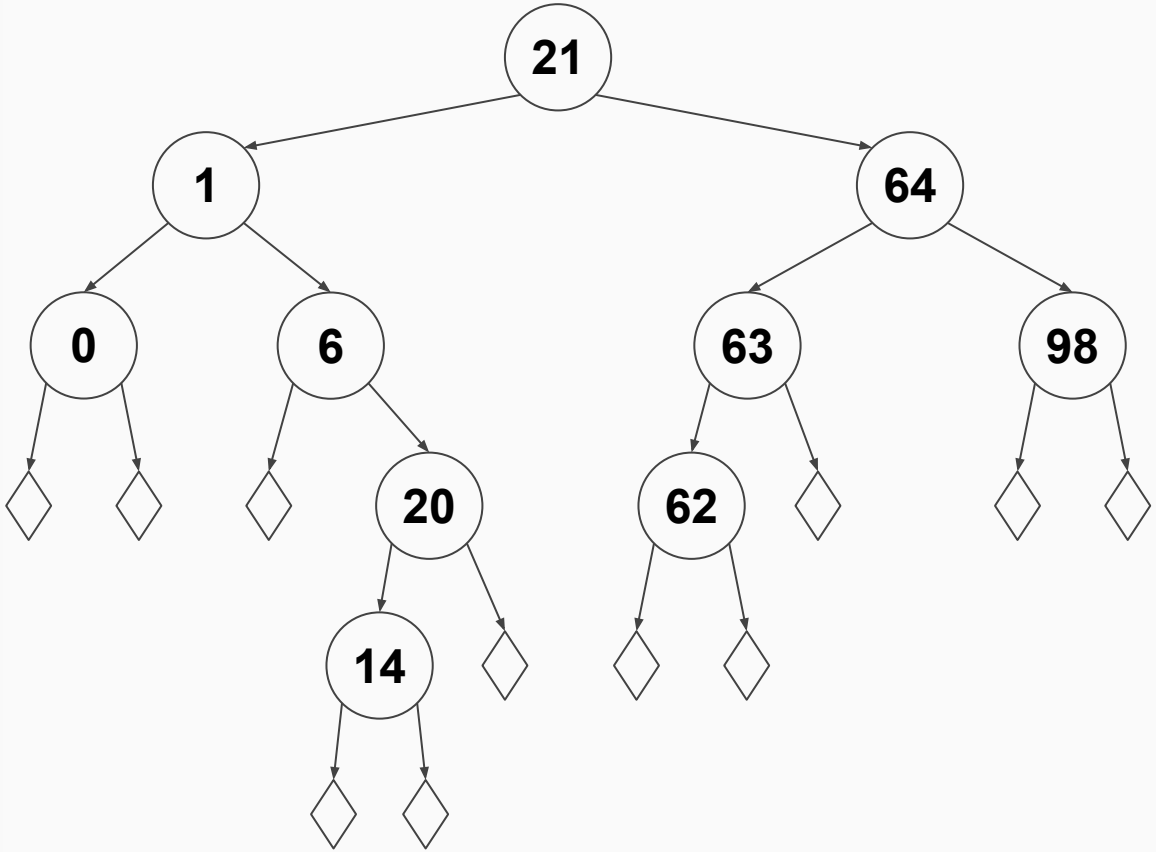
Does this tree satisfy the Empty Leaf depth constraint at the root?



Balanced Trees

Does this tree satisfy the Empty Leaf depth constraint at the root? **Yes!**

Does this tree satisfy the Empty Leaf depth constraint for **EVERY SUBTREE?**

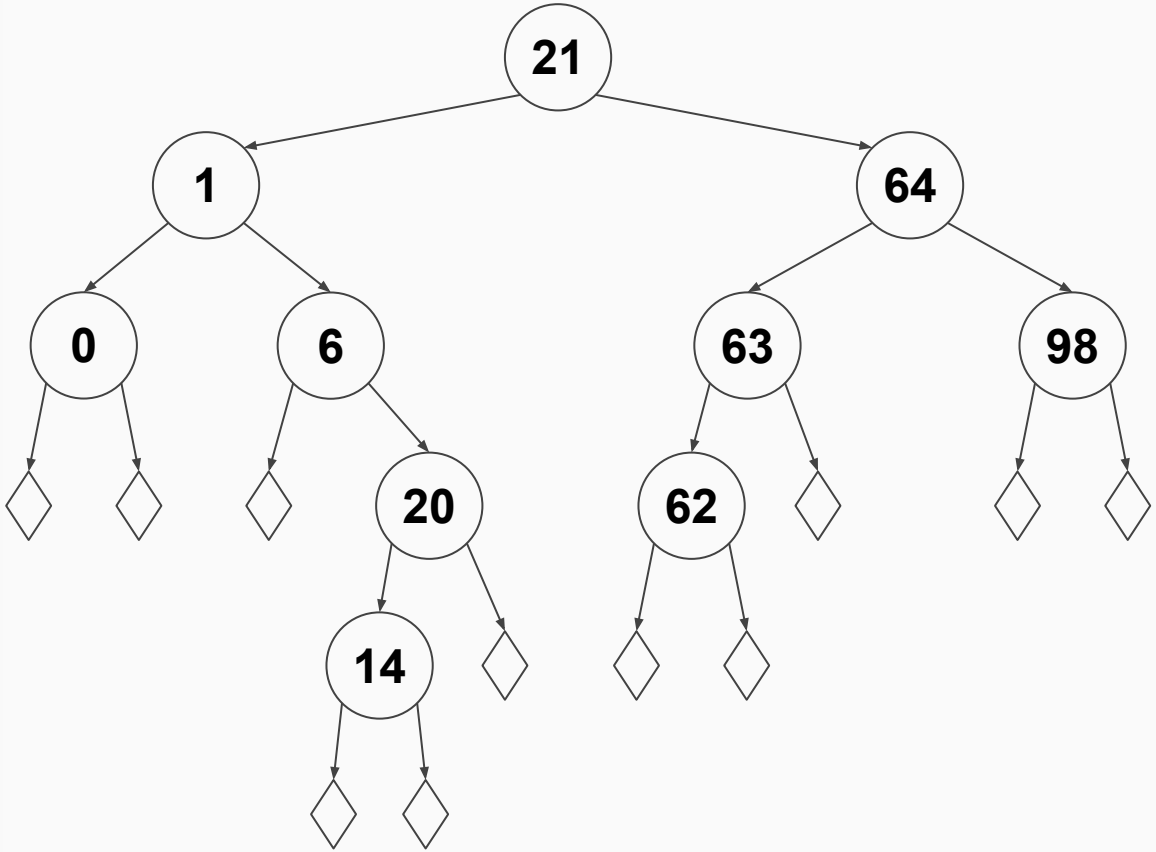


Balanced Trees

Does this tree satisfy the Empty Leaf depth constraint at the root? **Yes!**

Does this tree satisfy the Empty Leaf depth constraint for **EVERY SUBTREE? NO!**

Find a subtree that doesn't satisfy the constraint.

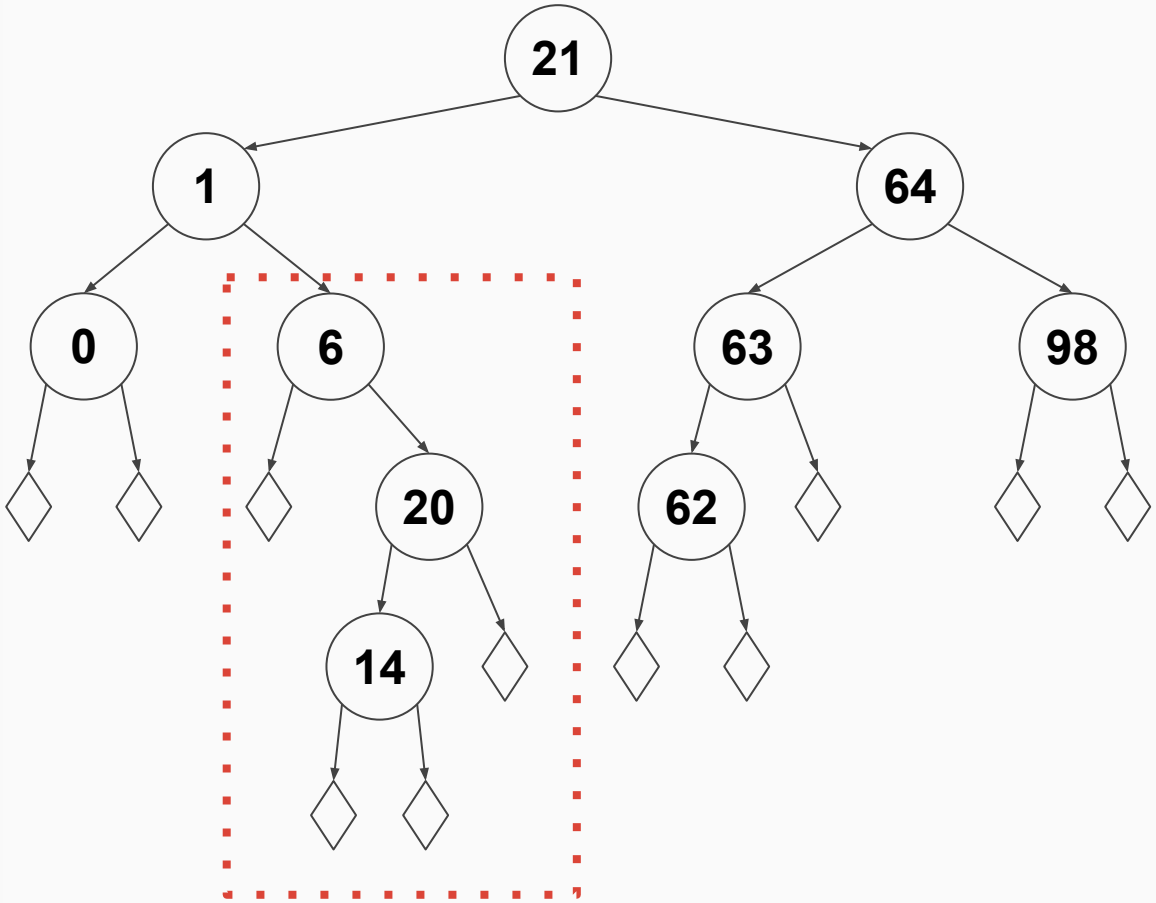


Balanced Trees

Does this tree satisfy the Empty Leaf depth constraint at the root? **Yes!**

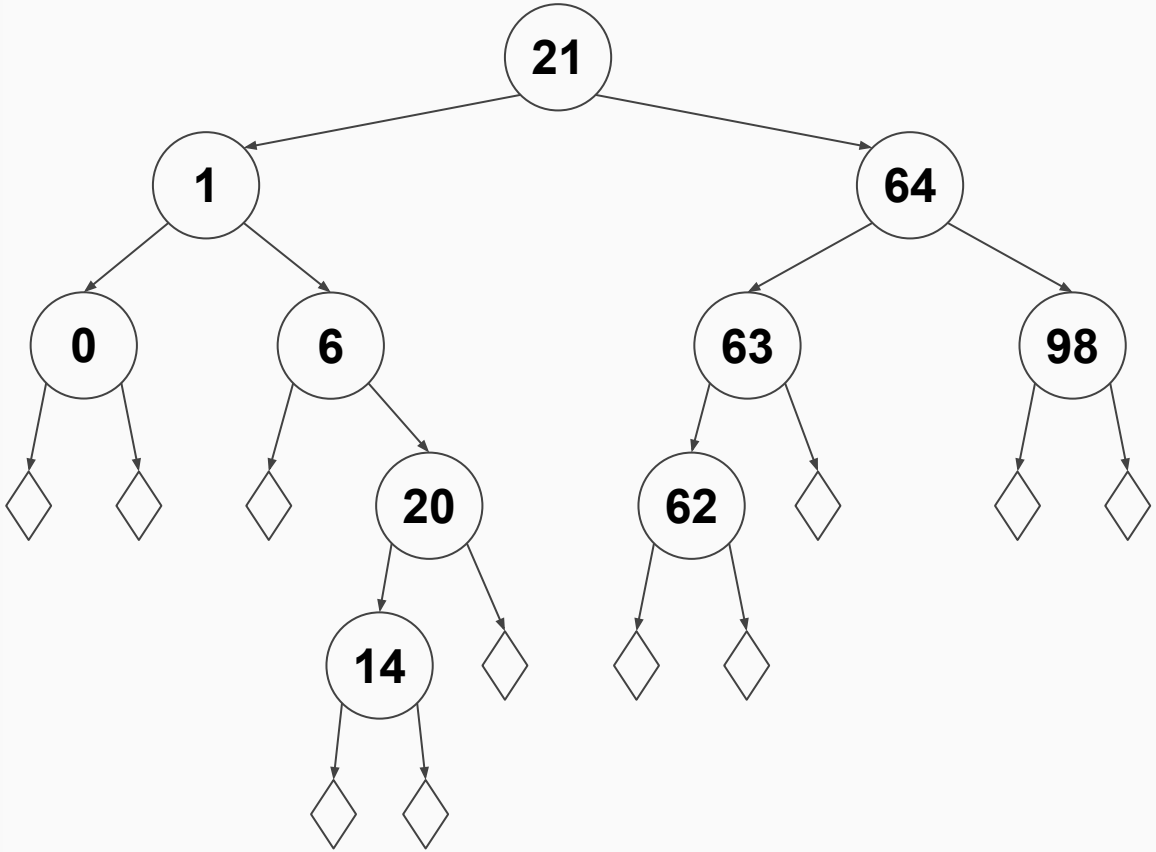
Does this tree satisfy the Empty Leaf depth constraint for **EVERY SUBTREE? NO!**

Find a subtree that doesn't satisfy the constraint. The depth of the shallowest Empty Leaf in this tree is 1, the deepest is 3...that breaks the constraint. **This is not a valid red black tree!**



Balanced Trees

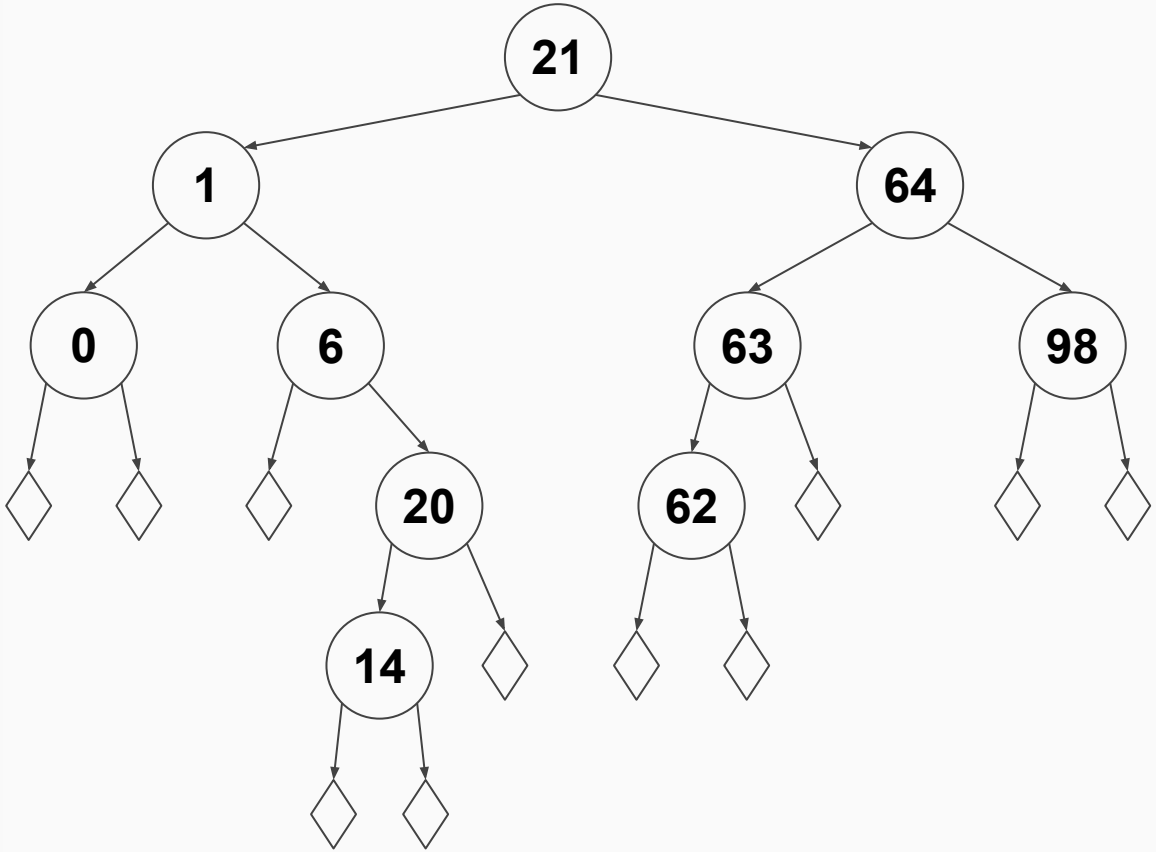
Does this tree satisfy AVL tree constraints?



Balanced Trees

Does this tree satisfy AVL tree constraints? **NO!**

What is the deepest node that breaks the AVL property?

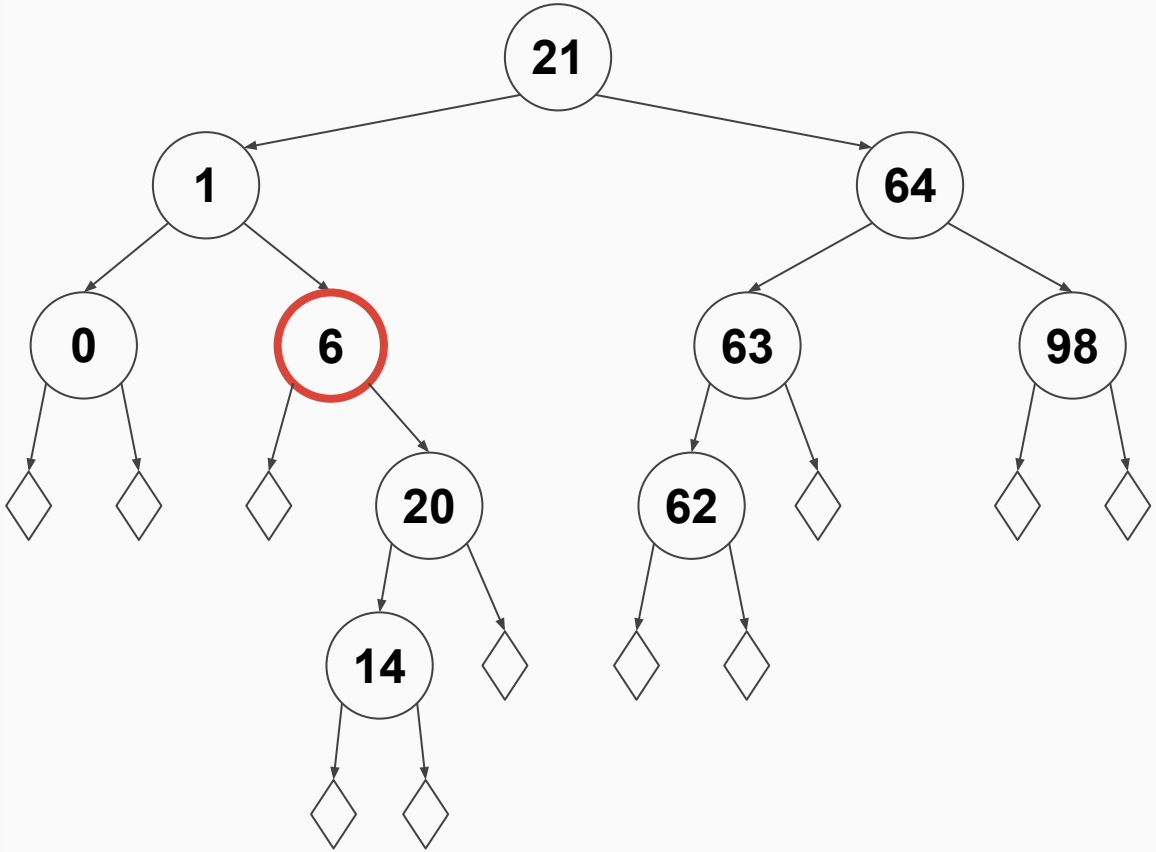


Balanced Trees

Does this tree satisfy the AVL-tree property? **NO!**

What is the lowest node in the tree that breaks the AVL constraint? **(6 has a balance factor of 2; so does 1 but 6 is lower)**

What operations need to be performed to fix the AVL tree constraint?

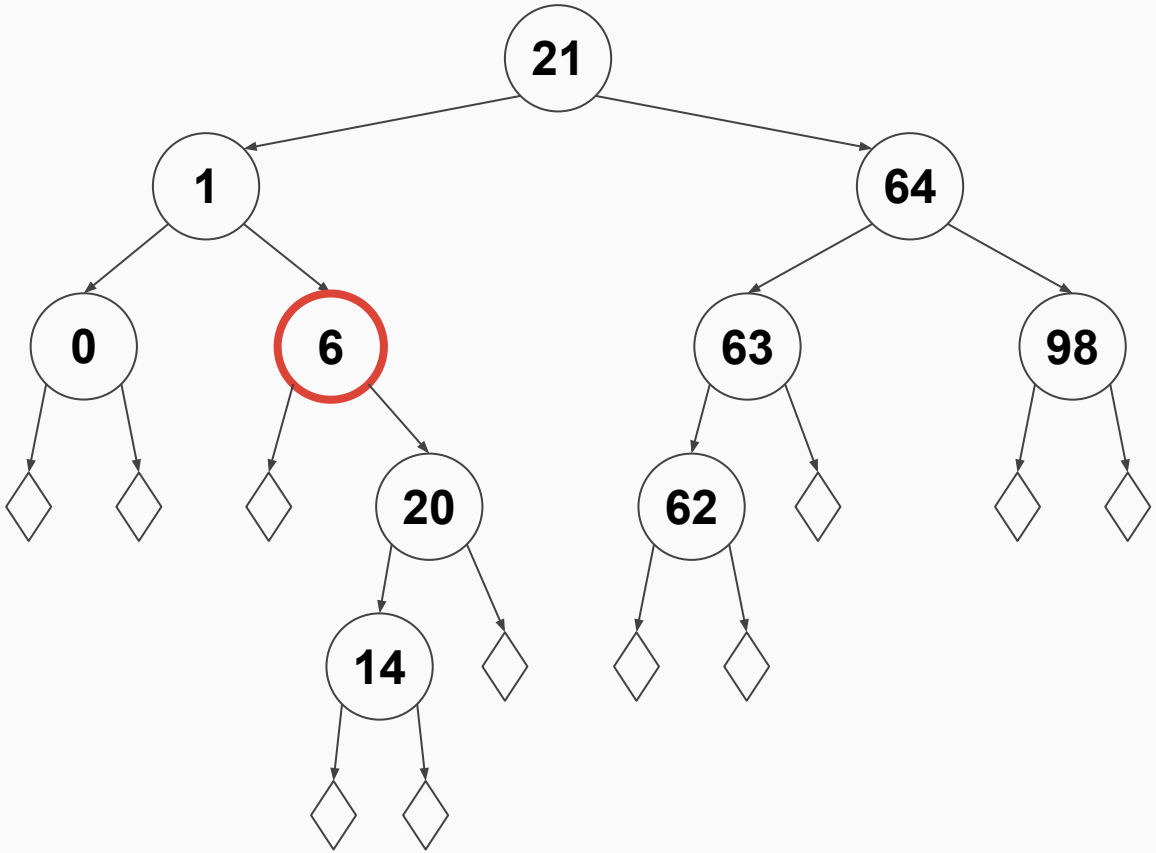


Balanced Trees

Does this tree satisfy the AVL-tree property? **NO!**

What is the lowest node in the tree that breaks the AVL constraint? **(6 has a balance factor of 2; so does 1 but 6 is lower)**

What operations need to be performed to fix the AVL tree constraint? **(Rotate right around 20, then left around 6)**



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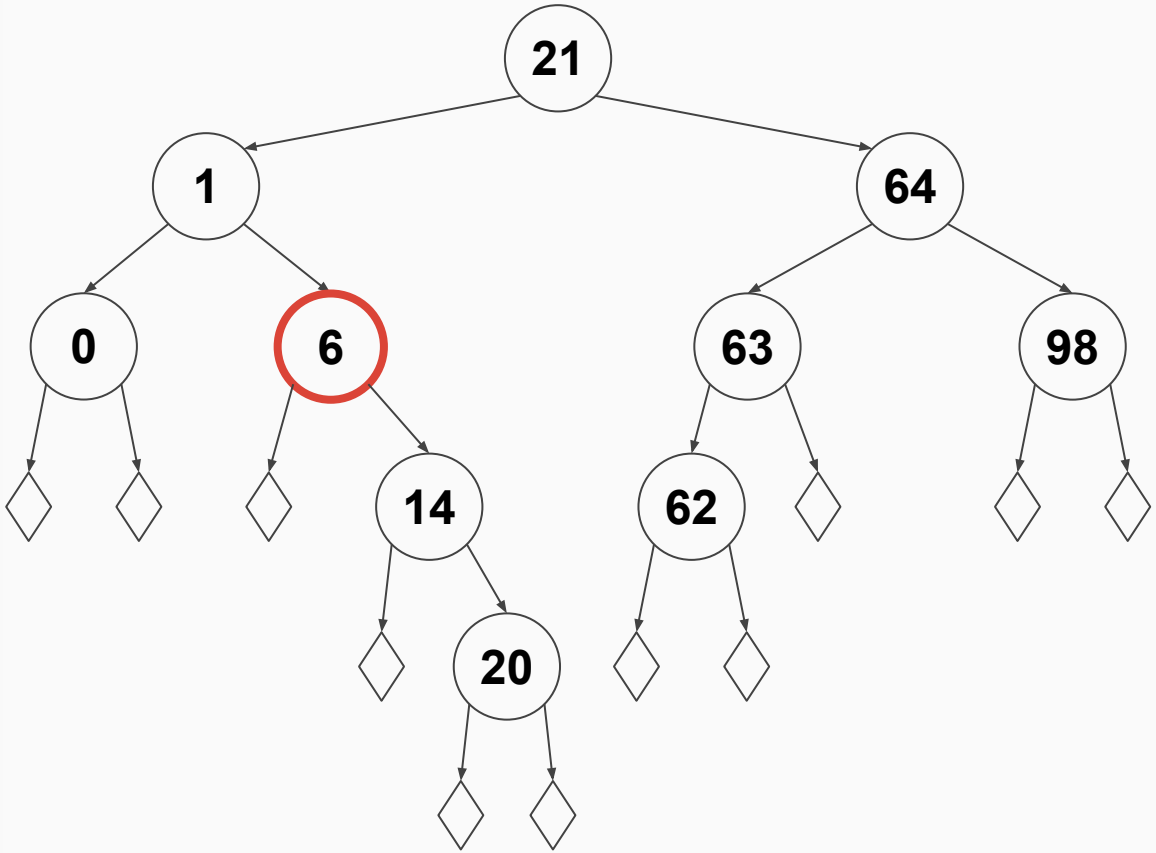

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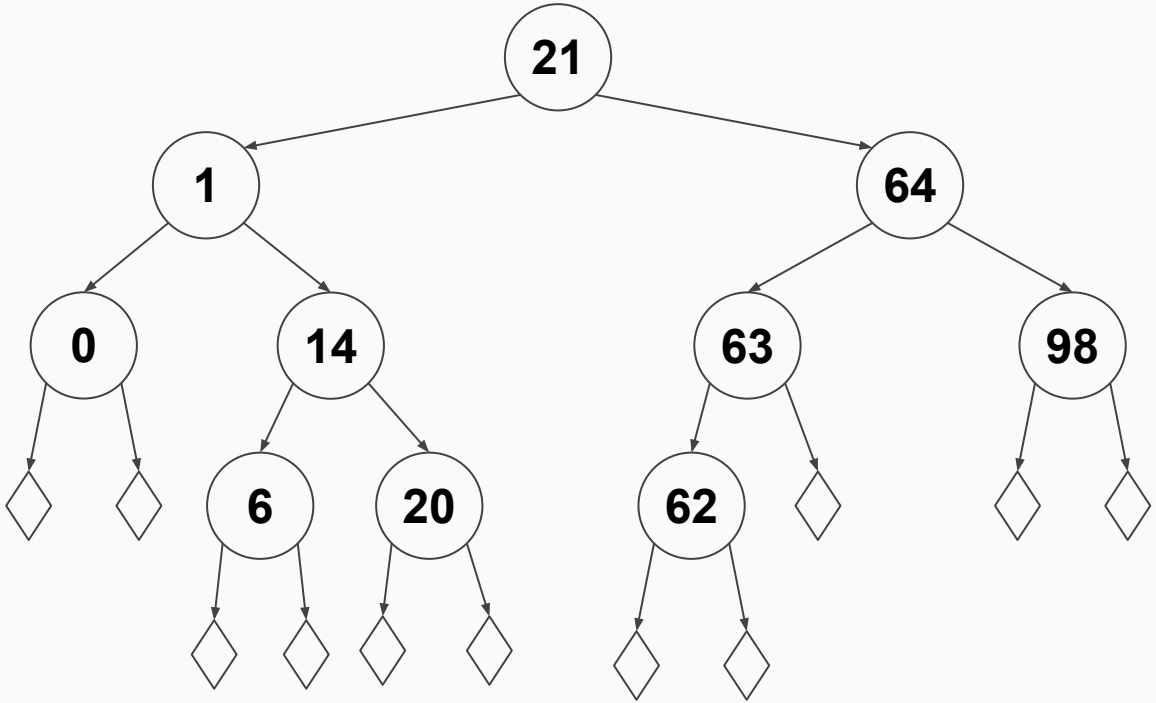
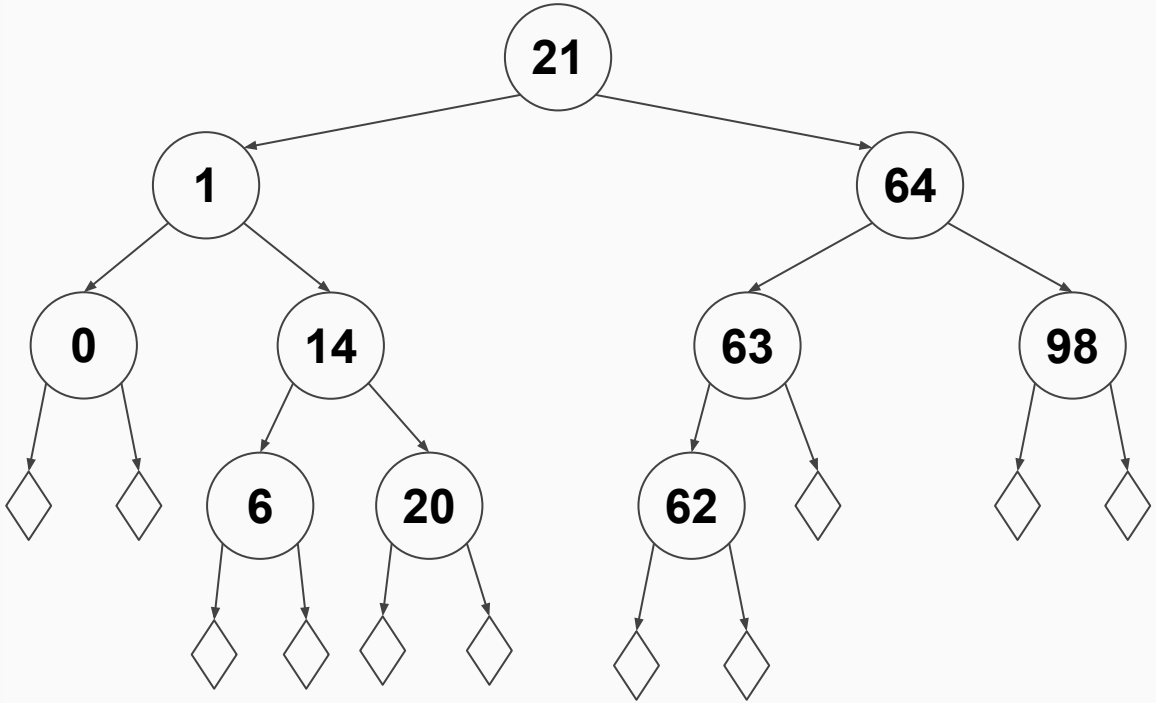


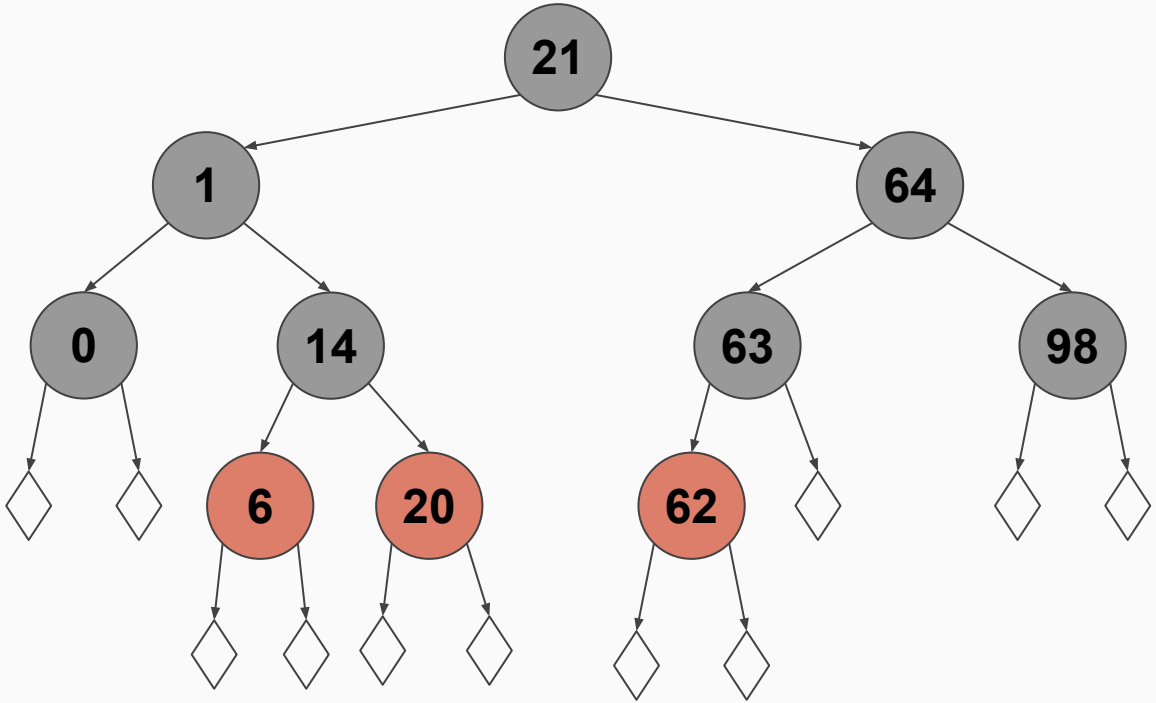
Balanced Trees

Now verify that it IS an AVL tree AND a Red-Black tree. Color the Red-Black Tree.



Balanced Trees

Now verify that it IS an AVL tree AND a Red-Black tree. Color the Red-Black Tree.



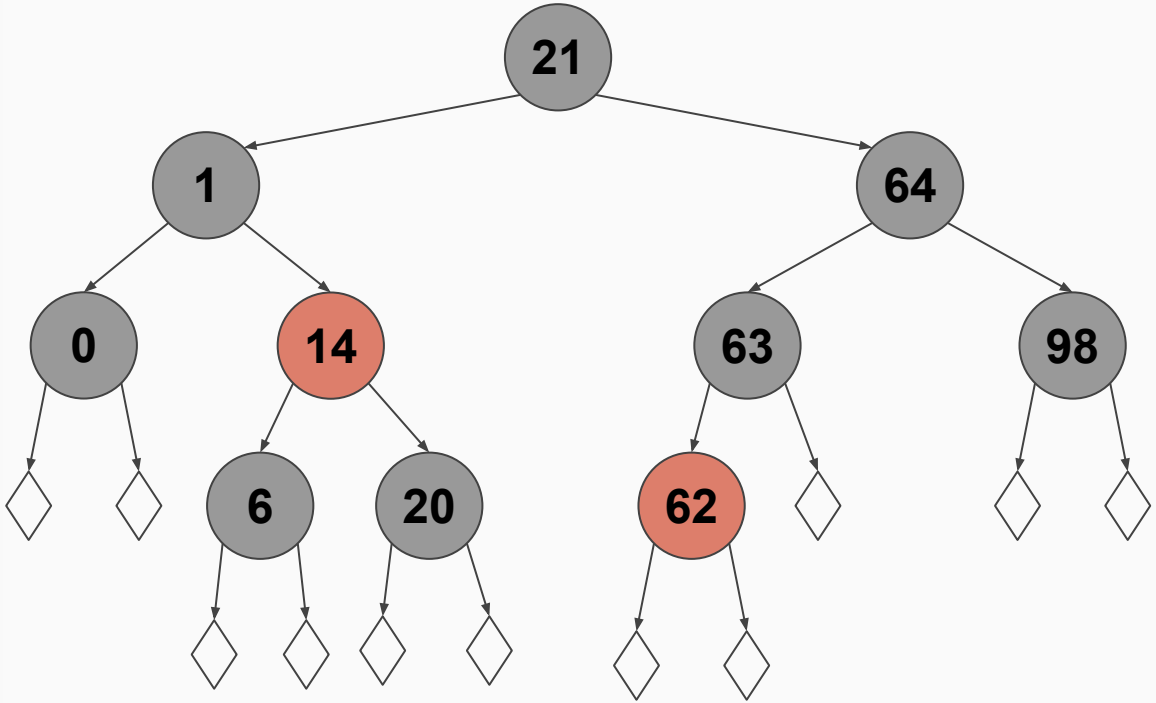
...OR

Balanced Trees

Now verify that it IS an AVL tree AND a Red-Black tree. Color the Red-Black Tree.

What's the fewest number of nodes you would need to insert to break AVL for this tree? What about Red-Black?

What's the maximum number of nodes you could insert before you need to fix the AVL tree? The Red-Black Tree?



Blooket Midterm Review

Review questions on Blooket:
https://dashboard.blooket.com/set/660b78748e1bd2b64620bd95