CS271 Group 17
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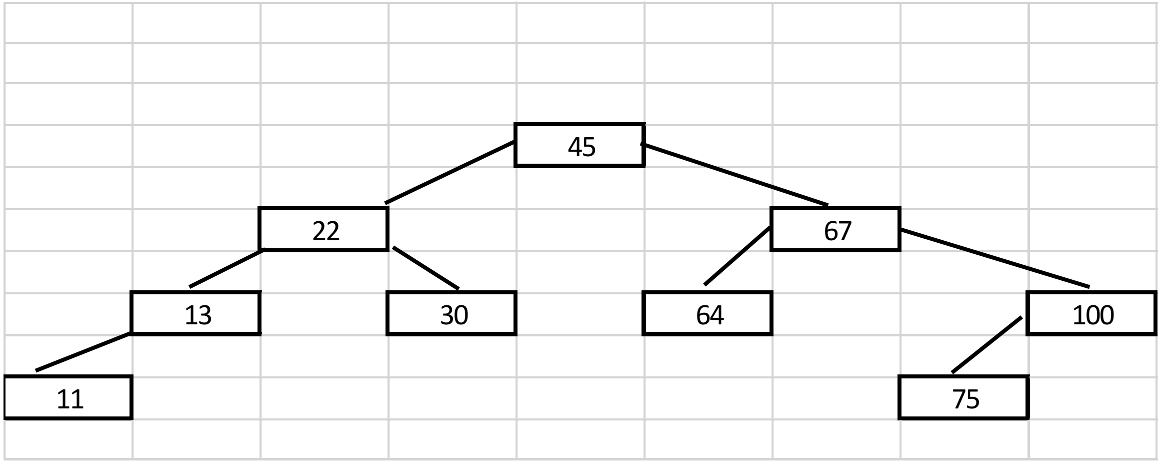
Worksheet 28: Binary Search Trees

In Preparation: Read Chapter 8 to learn more about the Bag data type, and chapter 10 to learn more about the basic features of trees. If you have not done so already, read Worksheets 21 and 22 for alternative implementation of the Bag.

In this worksheet we will practice the concepts of using a Binary Search Tree for the Bag interface. For each of the following problems, draw the resulting Binary Search Tree.

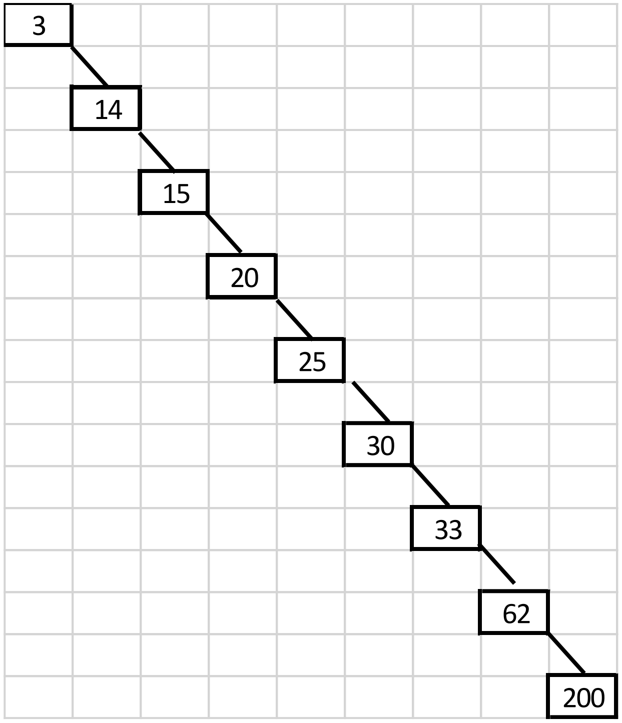
1. Add the following numbers, in the order given to a binary search tree. 45, 67, 22, 100, 75, 13, 11, 64, 30



2. What is the height of the tree from #1? What is the height of the subtree rooted at the node holding the value 22? What is the depth of the node holding the value 22?

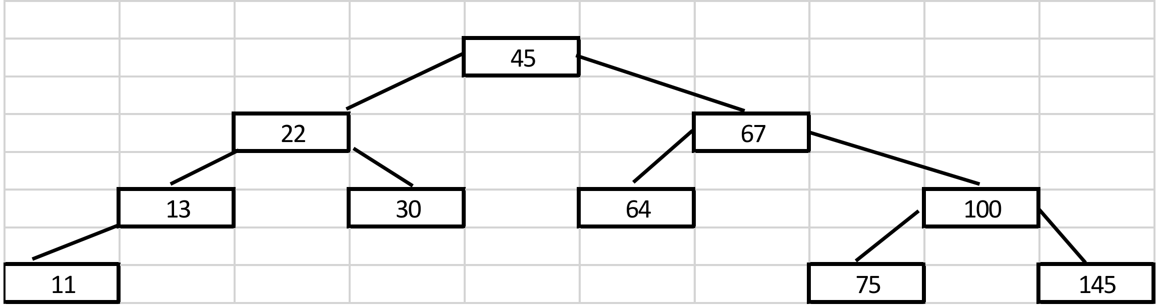
Height of the tree = 3.
Height of the subtree for value 22 is 2.
Depth of node for value 22 is 1

3. Add the following numbers, in the order given to a binary search tree. 3, 14, 15, 20, 25, 30, 33, 62, 200.

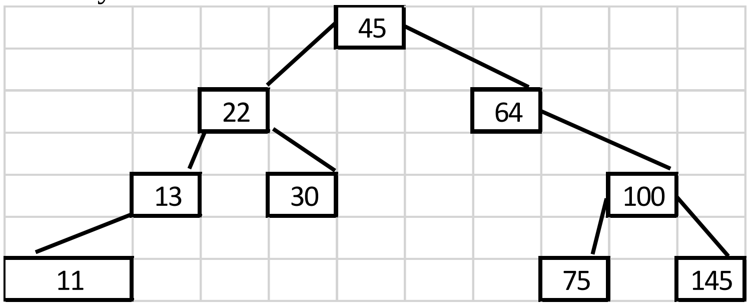


4. Is the tree from #3 balanced? Why not? What is the execution time required for searching for a value in this tree?
No it is not balanced since none of the nodes have a left node.
O(n) execution time since this basically resembles a linked list.

5. Add a new value, 145, to the tree from #1



6. Remove the value 67 from the tree from #1. What value did you replace it with and why?



Largest node (rightmost) value of the left subtree of 67 (64) is copied into the node to delete. Alternatively, the leftmost/smallest node of the right tree, 75, could replace it.