Data Structures - Lab Worksheet

Trees

Start by downloading the provided coding canvas for Binary Search Trees.

Question 1 - Basic

Implement the incomplete methods `is_leaf`, `nb_of_children`, and `height` in class `BSTNode`

Implement the incomplete method `height` in class `BinarySearchTree`

Question 2 - Add/Find an entry

Implement the incomplete methods `add` and `find` in classes `BSTNode` and `BinarySearchTree`

Question 3 - Traverse a tree & display its content

Implement the incomplete method `list_in_order` in class `BSTNode`

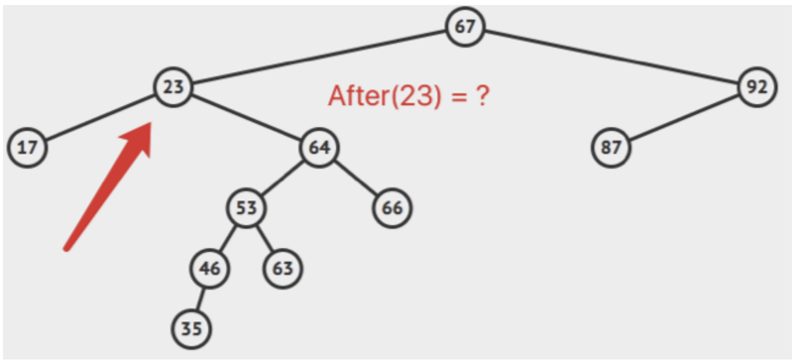
Implement the incomplete methods `list_in_order` and `list_breadth_first` in class `BinarySearchTree`

Question 4 - Removal training

Assume that, upon handling a request for the deletion of a node N with two child nodes, N gets swapped with its successor S, and S gets deleted instead.

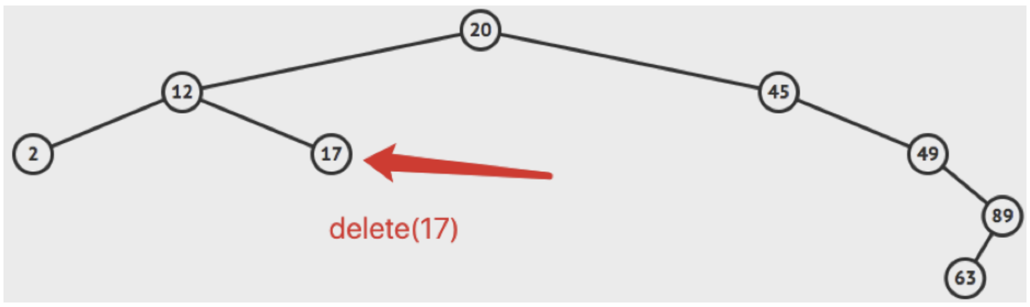
4.1. Successor

In the diagram below, which node is the successor of node 23?



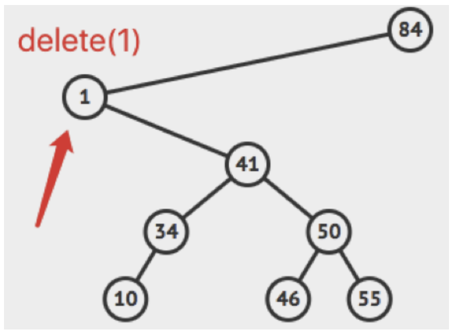
4.2. Removal 1

In the diagram below, draw the tree that results from removing node 17



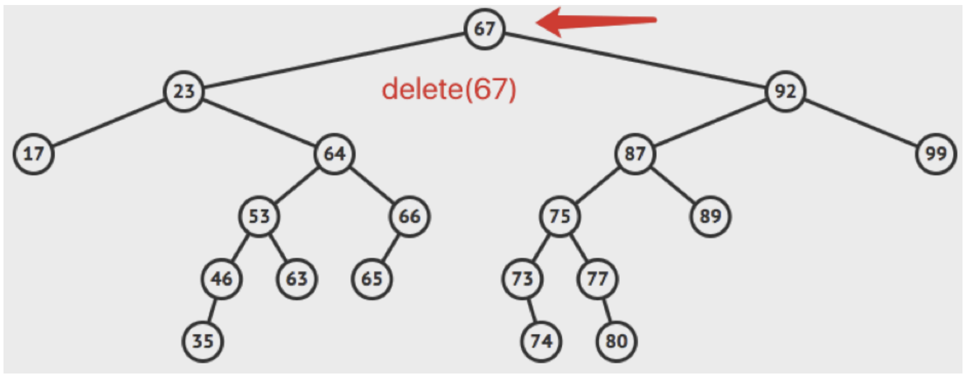
4.3. Removal 2

In the diagram below, draw the tree that results from removing node 1



4.4. Removal 3

In the diagram below, draw the tree that results from removing node 67



Question 5 - Remove an entry

Implement the incomplete method `remove` in classes `BSTNode` and `BinarySearchTree`

Question 6 - AVL training

6.1. Starting with an empty AVL tree, draw the shape of the tree after inserting the following values: 32, 44, 17, 88

6.2. Starting with the tree your drew in (6.1), draw the shape of the tree after inserting the following values: 23, 94, 11, 39

6.3. Starting with the tree your drew in (6.2), draw the shape of the tree after inserting the following values: 6, 9