DESCRIPTION

Insert Images

```
![rb.png](/files/acb7f5f6-25e6-4652-be87-50444389b564)
```

QUESTION 8.1 | POINTS 15 | Delete Question

Insert 39

PROBLEM

Insert Images Insert Field

```
Draw the tree after `insert(39)` is called.
(All steps must be shown for full credit)

|files|
```

QUESTION 8.2 | POINTS 10 | Delete Question

Insert 7

PROBLEM

Insert Images Insert Field

```
Draw the tree after `insert(7)` is called.

|files|

(All steps must be shown for full credit)
```

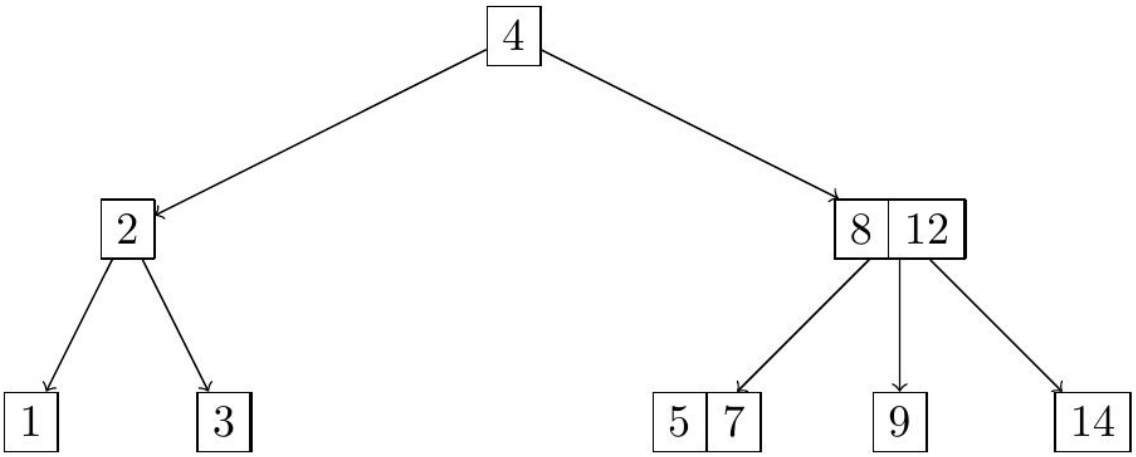
↳Add **Question 8.3**

✚ Add **Question 9**

Save

Q1 2-3 Trees

30 Points



Q1.1 Insert 6
15 Points

Draw the tree after `insert(6)` is called, without key rotations.
(All steps must be shown for full credit)

No files uploaded

Q1.2 Delete 1
15 Points

Using the original tree show the tree after `delete(1)` is called, with key rotations.
(You must show all work to receive full credit!)

No files uploaded

Q2 More 2-3 Insertions
20 Points

Starting with an empty tree, insert the following keys in order: 43, 95, 1, 79, 73, 85

Do this once *without* rotations, and once *with* rotations.

Q2.1 Without rotations
10 Points

Without rotations, which keys appear in the root node?

- [ ] 1
- [x] 43
- [ ] 73
- [x] 79
- [ ] 85
- [ ] 95

Q2.2 With rotations

10 Points

With rotations, which keys appear in the root node?

- [ ] 1
- [ ] 43
- [x] 73
- [ ] 79
- [x] 85
- [ ] 95

Q3 How tall am I?

4 Points

What is the height of an empty 2-3 Tree?

- (●) -1
- ( ) 0
- ( ) 1
- ( ) None of the Above

Q4 Perfectly balanced. As all things should be...

5 Points

Which of these (is/are) properties of 2-3 trees?

- [x] All nodes have 0 children or have the maximum they can support.
- [x] All leaves are at the same depth.
- [ ] All of a node's subtrees contain the same number of nodes.
- [x] A 2 node is like a BST node.

Q5 Some Formulaic Fun

5 Points

What are the minimum and the maximum number of levels in a 2-3 tree with n nodes? (Define the number of levels to be the height of the tree plus one.) Hint: Recall the formula for the geometric series:

$$\sum_{i=0}^{m-1} c^i = \frac{(c^m - 1)}{(c-1)}$$

No files uploaded

Q6 True or False

1 Point

A 2-3 Tree grows downward.

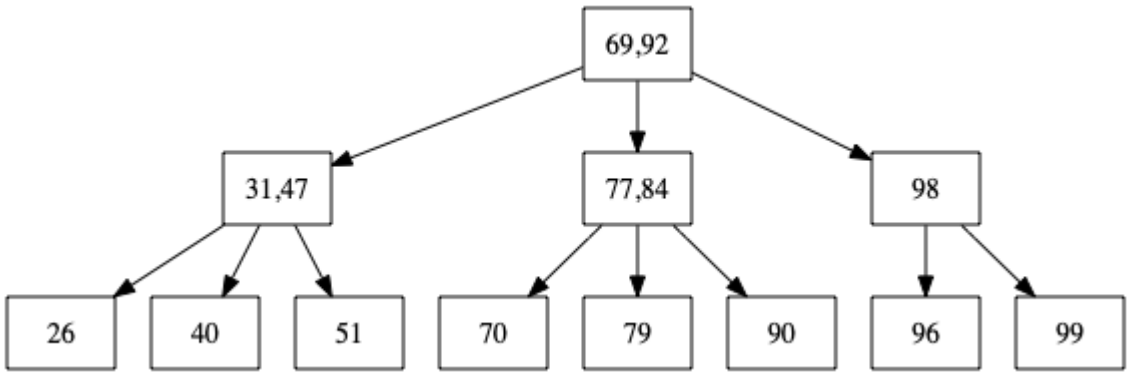
○ True

◉ False

Q7 Modeling 2-3 Trees with Red-Black Trees

10 Points

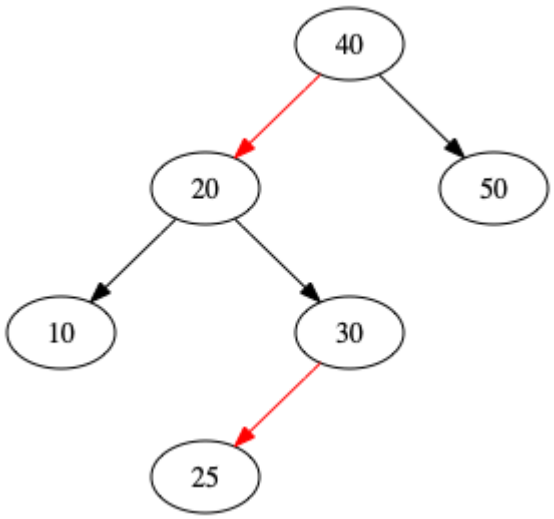
For the following 2-3 Tree, provide the corresponding Red-Black Tree. You may color the red links, or make them heavier lines annotated with an "R".



No files uploaded

Q8 Red-Black Trees

25 Points



Q8.1 Insert 39

15 Points

Draw the tree after `insert(39)` is called.

(All steps must be shown for full credit)

No files uploaded

Q8.2 Insert 7

10 Points

Draw the tree after `insert(7)` is called.

No files uploaded

(All steps must be shown for full credit)