

Name: _____ Andrew Id: _____

15-121 Fall 2019 Quiz 9

Up to 21 minutes. No calculators, no notes, no books, no computers. Show your work!

Write your favorite animal in the space for question 3.

1. Binary Search Tree

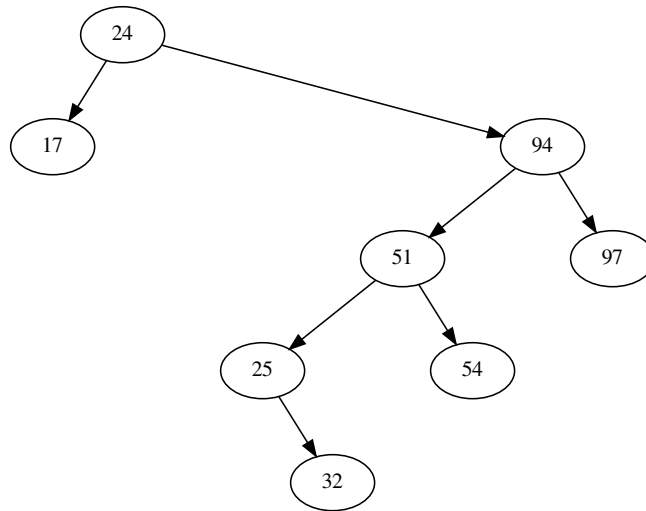
Imagine you are constructing a binary search tree of integers, and the following integers are added in the following order:

37, 94, 7, 35, 71, 97, 27, 1, 3, 77

(a) (4 points) Draw the resulting binary search tree.

(b) (3 points) Assuming you are using the in-order successor removal technique discussed in class, draw the state of your tree from (a) after 37 has been removed from it.

2. Consider the following tree:



(a) (2 points) Assuming the tree is traversed *in-order* and the nodes printed, what is the resulting sequence? (Assume that left is followed before right.)

(b) (2 points) Assuming the tree is traversed *pre-order* and the nodes printed, what is the resulting sequence? (Assume that left is followed before right.)

(c) (2 points) Assuming the tree is traversed *post-order* and the nodes printed, what is the resulting sequence? (Assume that left is followed before right.)

3. (1 point) ???

4. (6 points) Free Response

Imagine you are writing a program that stores information about songs. You write a `Song` class that has the following information about a song:

- Title (`String`)
- Artist (`String`)
- Composer (`String`)
- Album (`String`)

You choose the natural ordering for songs as being based on their title.

While writing other parts of the program, you want to sort an `ArrayList` of songs by artist, and if two songs have the same artist, then by title. You writing the following line of code:

```
Collections.sort(listOfSongs, new SongSortingThing());
```

Write the class `SongSortingThing` that makes this work as described. (To simplify things, you may just assume appropriately named public instance variables and getter methods exist for all of the attributes of a `Song`.)