Elle Simonds

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Intro to Algor.

Apr 16, 2025

Assignment 6

1. **A**. 7.9

/ \

0.5 8.2

\ \

1.0 9.9

\

6.5

/ \

1.2 7.0

\

2.4

\

5.6

/

3.6

Height = 8

B. Petit Four

/

Cupcake

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Donut

\

Eclair

\

Froyo

\

Gingerbread

\

Honeycomb

Height = 6

C. 32

/ \

5 94

\ /

10 87

/

85

\

47

/

25

\

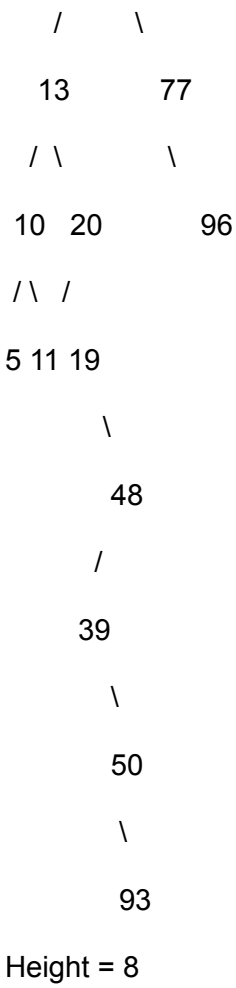
29

Height = 5

D. 34

/ \

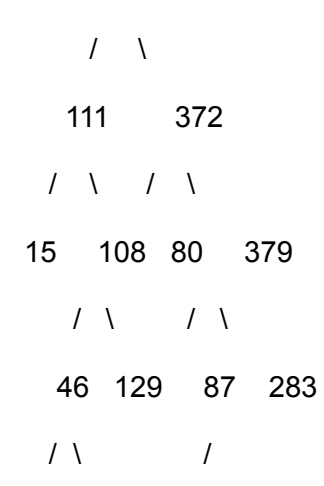
30 75


13
77
10
20
96
5
11
19
48
39
50
93

Height = 8

2.

a.


510
111
372
15
108
80
379
46
129
87
283

36 37 93

\

97

b. No, because the updated node values no longer maintain the BST property, which is left < root < right.

c. No, because the balance factor property of AVL trees is not maintained after updating the nodes.

5. 1. initializeCandidates(LinkedList<String> candidates)

- Time: O(n) – iterates once through n candidates to add to the HashMap and ArrayList.
- Space: O(n) – stores each candidate in both the voteCount map and candidateList.

2. castVote(String candidate)

- Time: O(1) – direct access and update in HashMap.
- Space: O(1) – no additional space used.

3. castRandomVote()

- Time: O(1) – random access in a list and then castVote (which is O(1)).
- Space: O(1) – no extra space used.

4. rigElection(String candidate)

- Time: O(n) – resets all vote counts (n candidates) and sets one to maxVotes.
- Space: O(1) – no new structures; reuses existing.

5. getTopKCandidates(int k)

- Time: O(n log n) – building the priority queue from n candidates takes O(n), polling top k takes O(k log n).
- Space: O(n) – stores all entries in a priority queue.

6. auditElection()

- Time: O(n log n) – similar to getTopKCandidates, must sort or heapify all n candidates.
- Space: O(n) – creates a maxHeap copy of the entries.