Week 08 Quiz

Plagiarism declaration

By submitting work for this quiz I hereby declare that I understand the University's policy on **academic integrity (https://academicintegrity.unimelb.edu.au/)** and that the work submitted is original and solely my work, and that I have not been assisted by any other person (collusion) apart from where the submitted work is for a designated collaborative task, in which case the individual contributions are indicated. I also declare that I have not used any sources without proper acknowledgment (plagiarism). Where the submitted work is a computer program or code, I further declare that any copied code is declared in comments identifying the source at the start of the program or in a header file, that comments inline identify the start and end of the copied code, and that any modifications to code sources elsewhere are commented upon as to the nature of the modification.

Due May 7 at 23:59 **Points** 10 **Questions** 10
Available Apr 28 at 10:00 - May 7 at 23:59 10 days **Time Limit** None
Allowed Attempts Unlimited

Instructions

You should attempt the quiz after the lecture and your tutorial.

- The quiz is available for a period of 10 days.
- You may attempt the quiz multiple times (if you happen to get a question wrong, you can do it again)
- Your score on the quiz will be recorded in the grade book.
- The quiz might not display equations correctly in some browsers. If you experience problems, we recommend that you use Firefox.

Note: you must complete at least eight of the weekly quizzes to meet one of the hurdle requirements in this subject.

This quiz was locked May 7 at 23:59.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	29 minutes	8 out of 10

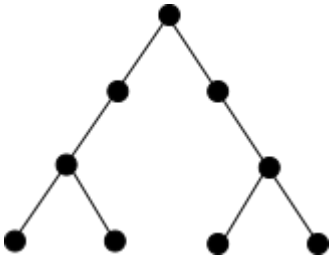
Score for this attempt: **8** out of 10
Submitted May 7 at 5:19
This attempt took 29 minutes.

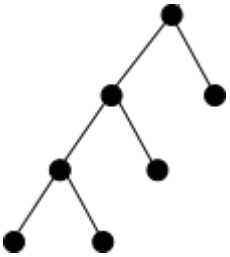
Question 1

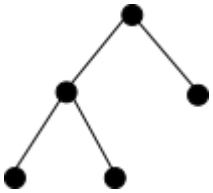
1 / 1 pts

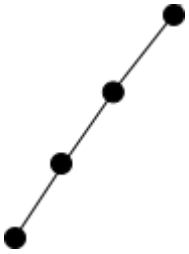
Which of the following binary trees are *balanced*? Note that you may select multiple answers.

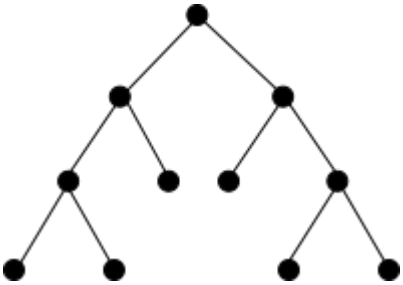
(a) 

(b) 

(c) 

(d) 

(e) 

(f) 

Correct!

- [x] (a)
- [ ] (b)
- [ ] (c)

Correct!

- [x] (d)
- [ ] (e)

Correct!

- [x] (f)

Correct! Trees (a), (d), and (f) are balanced. Trees (b), (c), and (e) are unbalanced.

To check whether a binary tree (or binary search tree) is balanced we perform the following test at each non-leaf node n. We compute the height of the left subtree of n, h(left subtree of n), and of the right subtree of n, height(right subtree of n). If the absolute difference between these two values is *less than or equal to* 1, for each non-leaf node, our tree is balanced. Consider tree (b). For each of the two children of the root node, this condition fails. The difference between the height of their left and right subtrees is 2. If a node does not have a left (or right) subtree, the height of that subtree is taken to be 0.

Question 2

1 / 1 pts

If a binary tree is both a max-heap and an AVL tree, what is its largest possible number of nodes, assuming all keys are different?

Correct!

2

orrect Answers

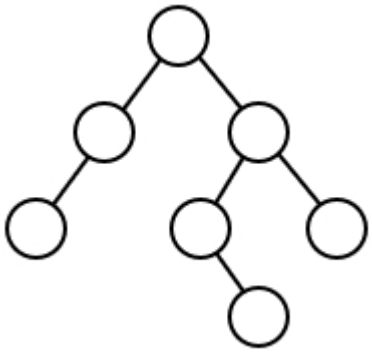
2 (with margin: 0)

That's right. Too easy.

Question 3

1 / 1 pts

The AVL tree shown below was constructed by inserting the seven keys in a particular order. Identify which of the four insertion sequences below would generate an AVL tree of this shape.



- A, B, C, D, E, F, G
- B, C, D, E, F, G, A
- C, E, G, B, D, F, A
- F, B, C, D, A, G, E

Correct!

Yes, that's right.

Question 4

1 / 1 pts

An AVL tree is constructed by inserting the following numbers in this order: 1, 7, 2, 6, 3, 5, 4. The in-, pre- and post-order traversals of the resulting tree are:

In-order: 1, 2, 3, 4, 5, 6, 7
Pre-order: 4, 2, 1, 3, 6, 5, 7
Post-order: 1, 3, 2, 5, 7, 6, 4

In-order: 5, 1, 3, 4, 6, 7, 2
Pre-order: 6, 1, 5, 3, 4, 7, 2
Post-order: 5, 4, 3, 1, 2, 7, 6

Correct!

In-order: 1, 2, 3, 4, 5, 6, 7
Pre-order: 3, 2, 1, 6, 5, 4, 7
Post-order: 1, 2, 4, 5, 7, 6, 3

In-order: 1, 2, 3, 4, 5, 6, 7
Pre-order: 2, 1, 6, 3, 4, 5, 7
Post-order: 1, 4, 5, 3, 7, 6, 2

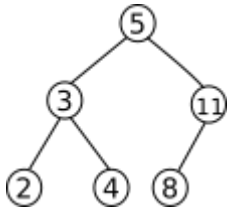
None of the above

Yes, well done.

Question 5

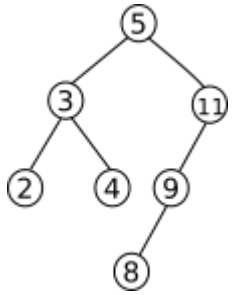
1 / 1 pts

Consider the following binary search tree:

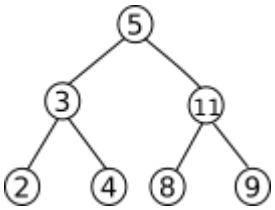


Which of the following trees is produced when key 9 is inserted into the above tree?

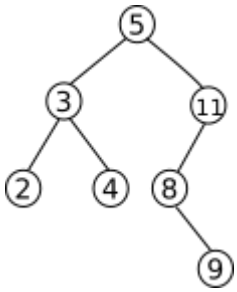
(a)



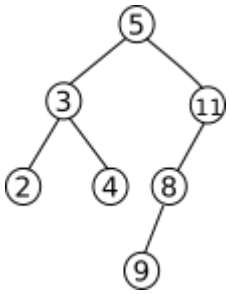
(b)



(c)



(d)



- (a)
- (b)
- (c) **Correct!**
- (d)

To insert key 9, we search through the tree, trying to find the location where 9 would reside if it were in the tree. Key 9 is greater than 5, and so we head down its right subtree. Similarly, key 9 is less than 11 and so we head down the left subtree of key 11. Key 9 is greater than 8, but key 8 has no children. Once we reach a node n with no children, we insert the key in the left subtree (if it is less than 8) and in the right subtree (if it is greater than 8). As 9 is greater than 8, we insert 9 as its right child.

Question 6

1 / 1 pts

What is the postorder traversal sequence for a binary tree whose preorder traversal sequence is A, B, C, D, E, F, G, H, I and whose inorder sequence is C, B, E, D, F, A, G, I, H ?

- C, E, F, D, B, H, I, G, A
- C, E, F, D, B, H, G, I, A
- C, E, F, B, D, I, H, G, A
- C, E, F, B, D, H, I, G, A

Correct!

- None of the above

That's correct. In fact the postorder sequence is C, E, F, D, B, I, H, G, A.

Question 7

1 / 1 pts

Which of the statements is correct regarding achieving O(*log n*) search time, where *n* is the number of nodes, on a binary search tree?

- The binary search tree has to be complete.
- Using binary search trees we can guarantee O(log n) search time.

Correct!

- The height of the tree needs to be c log(n), where c is a constant.
- The only way to guarantee O(log n) search time is turning the binary search tree into an AVL tree.

Question 8

0 / 1 pts

A 2-3 tree was constructed by inserting the following integer keys on the order given:

10, 15, 1, 2, 3, 12, 17, 19

After inserting all keys, how many different 3-nodes (i.e., 3-nodes holding distinct key pairs) were created?

ou Answered

4

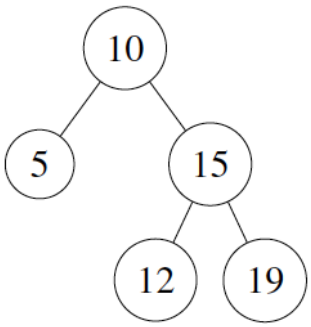
orrect Answers

5 (with margin: 0)

Question 9

0 / 1 pts

Consider the following AVL tree.



After inserting 13 into the tree and balancing where necessary, what will be the resulting key/value of the root node?

ou Answered

15

orrect Answers

12 (with margin: 0)

Question 10

1 / 1 pts

What is the minimum number of nodes in an AVL tree of height 6?

Correct!

33

orrect Answers

33 (with margin: 0)

Quiz Score: **8** out of 10