

1. **Tree T1:** How many leaves does it have?
  - A. 2
  - B. 4
  - C. 6
  - D. 8
  - E. 9
2. **Tree T1:** How many of the nodes have at least one sibling?
  - A. 5
  - B. 6
  - C. 7
  - D. 8
  - E. 9
3. **Tree T1:** What is the value stored in the parent node of the node containing 30?
  - A. 10
  - B. 11
  - C. 14
  - D. 40
  - E. None of the above
4. **Tree T1:** How many descendants does the root have?
  - A. 0
  - B. 2
  - C. 4
  - D. 8
5. **Tree T1:** What is the depth of the tree?
  - A. 2
  - B. 3
  - C. 4
  - D. 8
  - E. 9
6. **Tree T1:** How many children does the root have?
  - A. 2
  - B. 4
  - C. 6
  - D. 8
  - E. 9

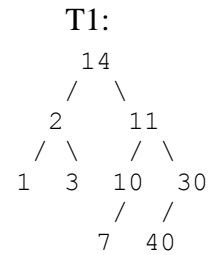
7. **Tree T1:** Which statement is correct?
- A. The tree is neither complete nor full.
  - B. The tree is complete but not full.
  - C. The tree is full but not complete.
  - D. The tree is both full and complete.
8. What is the minimum number of nodes in a full binary tree with depth 3?
- A. 3
  - B. 4
  - C. 8
  - D. 11
  - E. 15
9. What is the minimum number of nodes in a complete binary tree with depth 3?
- A. 3
  - B. 4
  - C. 8
  - D. 11
  - E. 15
10. Select the one true statement.
- A. Every binary tree is either complete or full.
  - B. Every complete binary tree is also a full binary tree.
  - C. Every full binary tree is also a complete binary tree.
  - D. No binary tree is both complete and full.
11. Suppose T is a binary tree with 14 nodes. What is the minimum possible depth of T?
- A. 0
  - B. 3
  - C. 4
  - D. 5
12. Select the one FALSE statement about binary trees:
- A. Every binary tree has at least one node.
  - B. Every non-empty tree has exactly one root node.
  - C. Every node has at most two children.
  - D. Every non-root node has exactly one parent.
13. Consider the node of a complete binary tree whose value is stored in `data[i]` for an array implementation. If this node has a right child, where will the right child's value be stored?
- A. `data[i+1]`
  - B. `data[i+2]`
  - C. `data[2*i + 1]`
  - D. `data[2*i + 2]`

14. Suppose that a binary taxonomy tree includes 8 animals. What is the minimum number of NONLEAF nodes in the tree?

- A. 1
- B. 3
- C. 5
- D. 7
- E. 8

15. **Tree T1:** What is the order of nodes visited using a pre-order traversal?

- A. 1 2 3 7 10 11 14 30 40
- B. 1 2 3 14 7 10 11 40 30
- C. 1 3 2 7 10 40 30 11 14
- D. 14 2 1 3 11 10 7 30 40



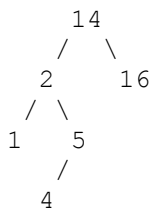
16. **Tree T1:** What is the order of nodes visited using an in-order traversal?

- A. 1 2 3 7 10 11 14 30 40
- B. 1 2 3 14 7 10 11 40 30
- C. 1 3 2 7 10 40 30 11 14
- D. 14 2 1 3 11 10 7 30 40

17. **Tree T1:** What is the order of nodes visited using a post-order traversal?

- A. 1 2 3 7 10 11 14 30 40
- B. 1 2 3 14 7 10 11 40 30
- C. 1 3 2 7 10 40 30 11 14
- D. 14 2 1 3 11 10 7 30 40

18. Consider this binary search tree:



Suppose we remove the root, replacing it with something from the left subtree. What will be the new root?

- A. 1
- B. 2
- C. 4
- D. 5
- E. 16

