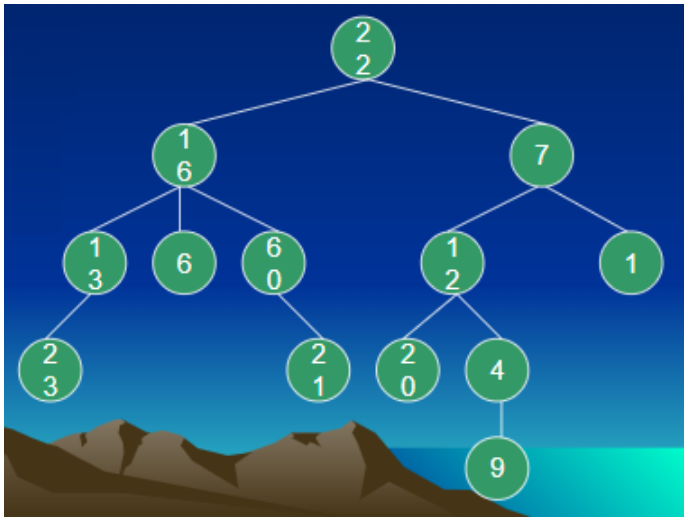
Alcala, Lance Wesley B. **BSCPE 2-1** **202101468** **01/13/2023**

Trees Exercise

1. Name the three properties of a tree.
   Answer: connected, acyclic, and undirected graph
2. Is a tree a forest?
   Answer: Yes, but a forest is not a tree because it is not connected.
3. What do you call the special designated node in a tree?
   Answer: Root
4. What is the minimum number of nodes in a tree?
   Answer: 1
5. Can a tree have no subtrees at all?
   Answer: Yes



Given the tree, identify the ff.:

6. Children of node 16.
   Answer: 13, 6, and 60
7. Parent of node 1.
   Answer: 7
8. Siblings of 23.
   Answer: None
9. Ancestors of 9.
   Answer: 22, 7, 12, and 4
10. Descendants of 16.
    Answer: 13, 6, 60, 23, and 21
11. Leaves
    Answer: 23, 6, 21, 20, 9, and 1
12. Non-leaves
    Answer: 22, 16, 7, 13, 60, 12, and 4

13. Depth of node 4.
    Answer: <u>Node 4 has depth 3.</u>
14. Degree of the tree.
    Answer: <u>3.</u>
15. Height of the tree.
    Answer: <u>4.</u>
16. Weight of the tree.
    Answer: <u>6.</u>
17. Is the tree a binary tree?
    Answer: <u>Yes.</u>
18. Removing 6, is the tree a full binary tree?
    Answer: <u>No.</u>
19. Removing 6, is the tree a complete binary tree?
    Answer: <u>No.</u>
20. Is a full binary tree complete?
    Answer: <u>No.</u>
21. Is a complete binary tree full?
    Answer: <u>Yes.</u>
22. How many leaves does a complete n-ary tree of height h have?
    Answer: <u>n^h</u>
23. What is the height of a complete n-ary tree with m leaves?
    Answer: <u>log m</u>
24. What is the number of internal nodes of a complete n-ary tree of height h?
    Answer: $\mathbf{1 + n + n^2 + \cdots + n^{h-1} = \sum_{i=0}^{h-1} n^i = \frac{n^h - 1}{n-1}}$
25. What is the total number of nodes a complete n-ary tree height h have?
    Answer: 2^h - 1