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BSCpE 2-1

1. Name the three properties of a tree.
    - Connected, acyclic (no cycle) and undirected graph
2. Is a tree a forest?
    - Yes, a tree is a forest but a forest is not a tree because it is not connected
3. What do you call the special designated node in a tree?
    - Root node is the special designated node in a tree
4. What is the minimum number of nodes in a tree?
    - Tree must contain at least 1 node
5. Can a tree have no subtrees at all?
    - Yes, a tree can have no subtrees at all
6. Children of node 16.
    - Nodes 13, 6, 60 are children of Node 16
7. Parent of node 1.
    - Node 7 is the parent of Node 1
8. Siblings of 23.
    - Node 23 has no siblings
9. Ancestors of 9.
    - Nodes 22, 7, 12 and 4 are ancestors of node 9
10. Descendants of 16.
    - Nodes 13, 6, 60 are descendants of node 16
11. Leaves.
    - Leaves: Nodes 6, 23, 21, 20, 9, 1
12. Non-leaves.
    - Non-leaves: Nodes 22, 16, 7, 13, 60, 12 and 4
13. Depth of node 4.
    - Node 4 has depth 3
14. Degree of the tree.
    - This tree has degree 3
15. Height of the tree.
    - Node 22 = Height 4; Nodes 16 and 7 = Height 3; Nodes 13, 6, 60, 12 and 1 = Height 2; Nodes 23, 21, 20 and 4 = Height 1; Node 9 = Height 0
16. Weight of the tree.
    - The weight of this tree is 6
17. Is the tree a binary tree?
    - No, a binary tree can only have nodes that contain a maximum of two children
18. Removing 6, is the tree a full binary tree?

- No, every node has either 0 or 2 children

19. Removing 6, is the tree a complete binary tree?
    - No, not all of the leaves have the same depth
20. Is a full binary tree complete?
    - Yes, if the levels of full binary tree (all nodes have either 0 or 2 children) are filled completely except the last level nodes which are as far left as possible
21. Is a complete binary tree full?
    - Yes, if each node of complete binary tree is either a leaf or has degree exactly 2
22. How many leaves does a complete n-ary tree of height h have?
    - Number of Leaves = n^h
23. What is the height of a complete n-ary tree with m leaves?
    - Height of a complete tree = $log_n m$
24. What is the number of internal nodes of a complete n-ary tree of height h?
    - Number of internal nodes = $\frac{n^h-1}{n-1}$
25. What is the total number of nodes a complete n-ary tree of height h have?
    - Total number of nodes = n^h + $\frac{n^h-1}{n-1}$