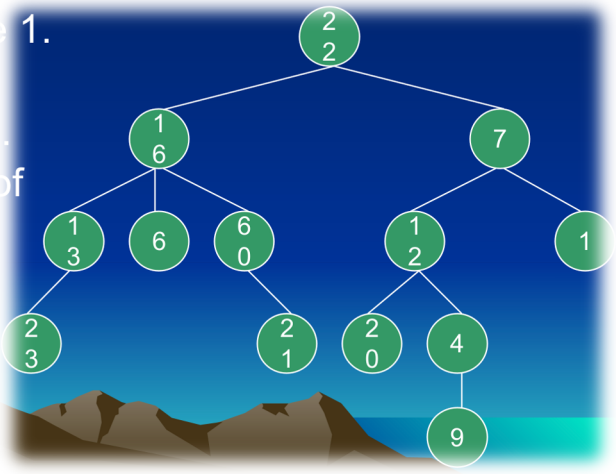
EXERCISES ON TREES

1. Name the three properties of a tree.
    - It is acyclic or there's no simple cycle
    - It can have no subtrees at all and it has a root node
    - It can be a forest.
2. Is a tree a forest?
    - Yes, a tree is a forest.
3. What do you call the special designated node in a tree?
    - Root
4. What is the minimum number of nodes in a tree?
    - One
5. Can a tree have no subtrees at all?
    - Yes

Given the tree to the right, identify the ff.



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

13. Depth of node 4.
    - Depth is 3.
14. Degree of the tree.
    - The degree of the tree is 3.
15. Height of the tree.
    - Height of the tree is 4.
16. Weight of the tree.
    - Weight of the tree is 6.
17. Is the tree a binary tree?
    - No
18. Removing 6, is the tree a full binary tree?
    - No
19. Removing 6, is the tree a complete binary tree?
    - No
20. Is a full binary tree complete?
    - No
21. Is a complete binary tree full?
    - Yes
22. How many leaves does a complete n-ary tree of height h have?
    - n^h
23. What is the height of a complete n-ary tree with m leaves?
    - $log_n m$
24. What is the number of internal nodes of a complete n-ary tree of height h?
    - $\frac{n^h-1}{n-1}$
25. What is the total number of nodes a complete n-ary tree of height h have?
    - $n^h - 1$