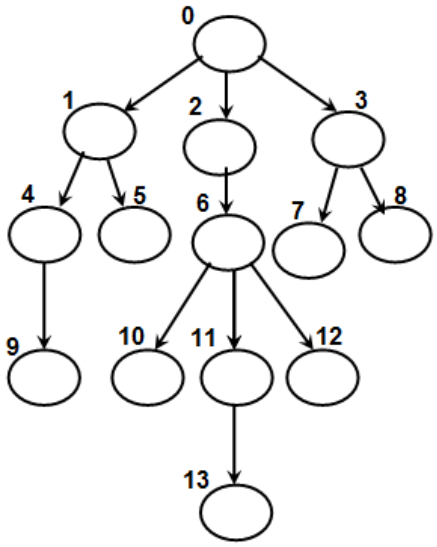
Module 5: Hash table

1) Given an array A = {45, 22, 11, 47, 44, 33, 23, 65} and a hash function H(v) = v mod 7, construct a hash table and determine the average number of comparisons for a successful search and unsuccessful search.

Module 6: Binary Tree

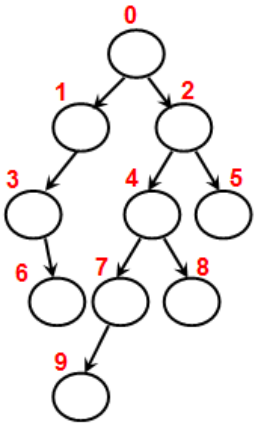
1) Consider a binary tree with 89 nodes. Determine the minimum possible height of the tree.
2) Given a tree, find the depth of all the leaf nodes and the height of all the internal nodes in the tree.



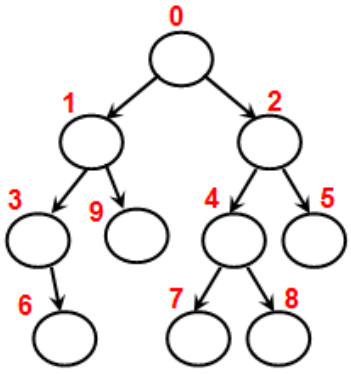
3) A binary tree is called a complete binary tree if each internal node has exactly two child nodes. Determine the number of leaf nodes and the number of internal nodes in a complete binary tree of height 5.

4) Given a binary tree, find the height of the internal nodes of the tree and determine whether the tree is height-balanced or not.

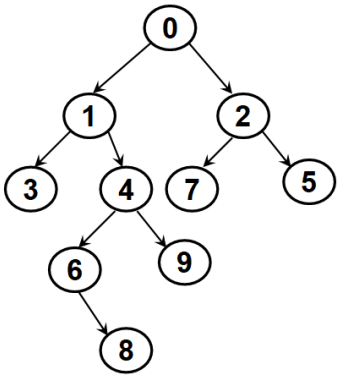
a)



b)



5) Given a binary tree, write down the preorder, inorder and postorder traversal of the vertices.



6) Given the inorder and postorder (or preorder) traversal of the vertices in a binary tree, construct the binary tree. Write down the preorder (or postorder) traversal of the vertices of the constructed binary tree.

Postorder: 3, 6, 9, 4, 1, 7, 8, 5, 2, 0

Inorder: 3, 1, 6, 4, 9, 0, 7, 2, 5, 8

Module 7: Binary Search Tree

1) Given an array of integers below:

12 5 1 4 18 9 9 15

(a) Sort the array using the Selection sort algorithm. Show the contents of the array after each iteration.
(b) Using the sorted array of integers, construct a binary search tree using the algorithm discussed in class.
(c) Determine the average number of comparisons for a successful search. Show all the work.
(d) Determine the average number of comparisons for an unsuccessful search. Show all the work.

2) Convert a given binary tree to a binary search tree without changing the structure.