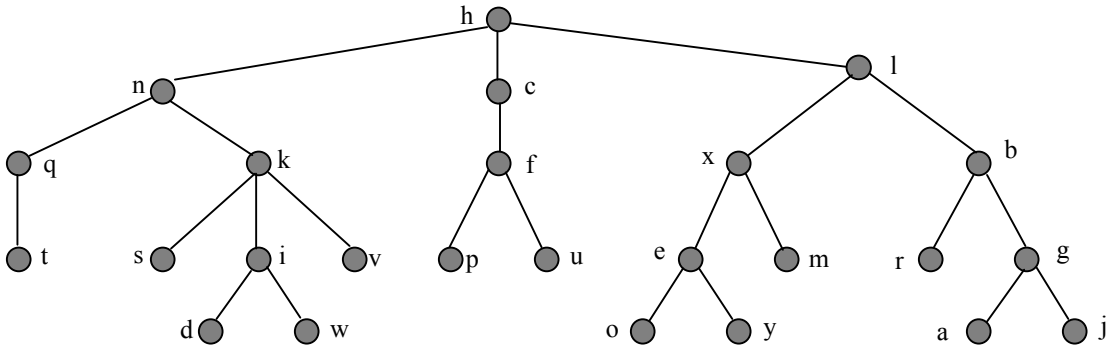
CS200 Fall 2014 HW 3 due 10/28/14 by **9:30AM**

Make sure you put your name and lab section on every sheet that you hand in.



Note: Use Rosen's definition of "level" and "height" for all questions using those terms.

1. Answer these questions about the tree above.
    a. Which vertex is the root?
    b. What is the arity (the "m" in m-ary) of the tree?
    c. What is the path from h to y?
    d. Which vertices are internal?
    e. Which vertices are the leaves?
    f. Which vertices are the children of x?
    g. Which vertices are the siblings of o?
    h. Which vertices are the ancestors of a?
    i. Which vertices are descendants of l?
    j. What is the level of g?
    k. What is the height of f?
    l. What is the degree of the tree?
    m. Is the tree full?
    n. Is the tree balanced?
    o. How many vertices are in the subtree rooted at k?
    p. What is the preorder traversal?
    q. What is the inorder traversal?
    r. What is the postorder traversal?
    s. What is the levelorder traversal?

2. For the sequence: {z,y,x,w,v,u,t,s,r,q,p,o,n,m}:
    a. Construct a complete binary tree with that as the postorder traversal.
    b. Construct the binary search tree that results when that is the insertion order (use alphabetic ordering).

3. For a binary tree of height 3:
    a. Draw a full tree.
    b. How many leaves can *any* binary tree of height 3 have?

4. For a full 3-ary tree, answer the following questions:
    a. Can it have 25 vertices?
    b. If it has 27 leaves, how many internal vertices does it have?
    c. If it has 121 vertices, how many are leaves, how many are internal and what height is it?

5. For the binary tree reference based implementation in the Prichard text, write an algorithm (or Java method if you prefer) for computing the *height* of a tree.