**CS220 - Lesson 18 – Tree Worksheet**

Answer the following questions:

1. What is the root node?
2. What are the children of node A? Node E? Node J?
3. What are the siblings of node C? Node G? Node K?
4. What are the ancestors of node J? Node D? Node H?
5. What are the descendants of node D? Node B? Node A?
6. Which nodes are terminal nodes?
7. Which nodes are branch nodes?
8. Given node E, list every relationship it has:
9. What is the degree of node B? node D? node A?
10. What is the level of node A? node G? node H?
11. What is the height of the tree? Of the sub-tree whose root is E?
12. Assuming the tree is a quad-tree:
    1. Is the tree full?
    2. Is the tree complete?
    3. Is the tree height-balanced?
13. Define what it means that a tree has no cycles?

Describe a tree and draw a diagram of a tree that is equivalent to a list. We call this a *degenerate tree*.

Describe the advantages of a *complete* and a *height-balanced* tree.

Trees can hold a lot of data. Determine the amount of data in a binary tree at each level of the tree and for the entire tree to each level.

Nodes in Total nodes  
 Level: in tree

Level 0:   
  
Level 1:   
  
  
  
Level 2:

Level 3:

Level n:

If you stored the name of every person on the earth, approximately 7 billion names, what would be the height of the binary tree?