Test #2 questions revised.

Two questions from the following ones will be given on the test, plus 5 – 6 practical problems (trace a data structure, define and/or compare efficiencies of program segments, etc.)

1. Define the Binary Tree ADT (definition, set of “generic” operations, give an example). Explain and compare linear and linked implementations of binary trees.

2. Describe binary tree traversals (inorder, postorder, preorder and level-order). Give examples of applications of these traversals -- describe an application of your choice in detail.

3. Define the General Tree ADT (definition, set of “generic” operations, example). Discuss different ways for implementing general trees, and compare them in terms of the efficiency of search operation.

4. Discuss general tree traversals and explain how they are carried out on the corresponding binary tree.

5. Describe and illustrate ternary tree implementation of the general tree. Discuss the preorder traversal of the ternary tree implementation of a general tree.

6. Define the Priority Queue ADT (definition, set of operations, example). Discuss implementations of a priority queue. Show how sorting can be done with a priority queue and compare in to elementary sorts.

7. Describe the Graph ADT. Explain depth-first and breadth-first traversals for both directed and undirected graphs. Use an example.

8. What is a weighted graph? Explain the minimum spanning tree problem, and compare Prim's and Kruskal's algorithms. Is there a unique spanning tree for a weighted graph? If not, give an example of a graph that has more than one minimum spanning tree. Can a minimum spanning tree contain a cycle?

9. Define the shortest path problem and describe Dijkstra's algorithm. Give an example to illustrate how this algorithm works. Using the same example, compare the shortest path from a designated vertex to all other vertices, to the minimum spanning tree originated from the same starting vertex. Are they the same?

10. Define the all shortest paths problem and explain Floid's algorithm. Can Dijkstra's algorithm be used for finding all shortest paths? Compare the two solutions to the all shortest paths problem.

11. What is the transitive closure of a graph? Explain Warshall's algorithm for computing the transitive closure. Use an example.

12. Explain the topological ordering problem and show how it is solved for directed acyclic graphs. Give an example.

**NOTE:** When describing an algorithm, do not forget to include the pseudocode. When discussing ADT implementations, make sure to include pseudocode for the main operations. Detailed examples tracing every step of the (discussed) operation can sometimes be used instead of a pseudocode.