Final exam questions revised.

Two questions from the following ones will be given on the test, plus 5 - 6 practical problems.

1. Describe the Dictionary ADT (give a definition, set of operations, example). Compare ordered vs unordered dictionaries in terms of the efficiency of main operations, and discuss different implementations of unordered dictionaries (hash tables being one of them).

2. What type of a tree is an AVL tree? Compare it to the binary search tree. Explain how search, insertion and deletion are performed on AVL trees. Discuss AVL tree implementation of ordered dictionaries.

3. Describe 2-3 trees (give a definition and an example). Explain how search and insertion are performed on 2-3 trees (use an example). How the efficiency of 2-3 trees compares to that of AVL trees? (again, an example will be useful to illustrate your answer).

4. Describe 2-3-4 trees, and show how they can be implemented by means of red-black trees. How 2-3-4 trees compare to 2-3 trees in terms of search efficiency (explain) and memory utilization?

5. Describe and compare selection sort, shell sort and merge sort. Give examples to show when each one of these sorts will be more preferable compared to other two.

6. Describe the Queue ADT (give a definition, set of operations, implementations). What kind of a queue is a priority queue? What is the most efficient implementation of the priority queue? Describe it (example will help).

7. Describe the Binary Tree ADT (definition, set of operations), and its implementations. Show how ordered lists can be implemented by means of binary trees. Explain the efficiency of this implementation and discuss how it is improved by 2-3 and 2-3-4 trees.

8. What kind of a binary tree is the heap? Explain how heaps are implemented. Describe in detail heap insertions and deletions. Discuss what heaps are used for.

9. Describe the Ranked Sequence ADT (definition, set of operations). Compare array-based and doubly linked list implementation of ranked sequence.

10. Describe heap sort and compare it to quick sort: trace both on the same example and compare their efficiencies.

11. Describe the Graph ADT. Explain depth-first and breadth-first traversals for both directed and undirected graphs. Give an example, pseudocode.

12. Describe the Weighted Graph ADT. Define and illustrate the shortest path and the minimum spanning tree problems, and explain the differences between them.

13. Describe the Directed Graph ADT. Explain and illustrate the topological ordering problem. Give an example, pseudocode.