

Advanced Data Structures (COP 5536 /NTU AD 711R)
Exam 2 (Nov. 8, 1999)
CLOSED BOOK
60 Minutes

NOTE All answers will be graded on correctness, efficiency, clarity, elegance and other normal criteria that determine quality. The points assigned to each question are provided in parentheses.

1. For min bionomial heap,
 - (a) (3) *Construct* a min bionomial heap using *insert* operations with the following key sequence: 1,2,7,4,3,5,6, and 8.
 - (b) (5) Perform a *DeleteMin* operation, showing each step.
2. Start with an empty two pass min pairing heap.
 - (a) (3) *Insert* the following sequence of keys: 6,4,5,3,7,8,9,10, and 11.
 - (b) (5) Perform a *DeleteMin* operation on the resulting heap of (a), showing each step.
 - (c) (4) Perform a *DeceaseKey* operation on the resulting heap of (b) to decrease key 8 to 2.
3. (7) Start with an empty AVL tree, and perform *insert* operations using the following sequence of keys: 3,7,8,5,4, and 6. Show each step.
4. For 2-3 trees,
 - (a) (5) *Construct* a 2-3 tree with keys: 1,2,3,4,5,6,7,8, and 9. The middle child of the root must be a 3-node and all the other nodes should be 2-nodes. And then, *Delete 3* showing each step.
 - (b) (5) *Construct* a 2-3 tree with keys: 1,2,3,4,5, and 6. The root and its right child should be 3-nodes. Then, *Insert 7* showing each step.
5. (8) Construct a red-black tree by inserting the keys in the sequence: 2,5,1,7,6,4,3. Show each step.
6. (5) What are the merits of red-black trees over 2-3 and 2-3-4 trees?