CS 278	**Analysis of Algorithms**	Test 3
Name:	Winter 2001	Max Pts: 52

Important: This is an open book test. You can use any books, notes, or paper. Any calculations and rough work can be done on the back side of the test pages. You will lose five points for not writing your name.

1. [12 pt] What is the number of comparisons and exchanges to insert the keys 12, 35, 26, 39, 80, 60, 100, 24, 33, 11, 19, and 86 in an initially empty ADT for search where the ADT is a linear list (not ordered in any way implemented using an array), binary tree implemented using an array, or a binary search tree implemented using pointers. You must reply for all of the specified ADTs. What is the cost of deleting an element from each of these structures in O notation?

2. [10 pt] Draw all the structurally different BSTs that can result when N keys are inserted into an initially empty tree, for $N = 5$.

3. [10 pt] In the following sequence, a number means insert and an asterisk means *delete the maximum* in the priority queue.

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22 42 17 82 * 100 * * 96 * 81 * 8 * * * 88 65 62 * * * 5 *
```

Show the heap at the end of each of these operations.

4. [10 pt] Demonstrate the insertion of the keys 48, 86, 92, 78, 8, 50, 6, 26, 46, 34 into a hash table using open addressing with linear probing. Let the table have 11 slots, and let the hash function be $h(k) = k \bmod 11$.

5. [10 pt] Draw the top-down 2-3-4 tree built when the keys 9, 12, 45, 52, 1, 37, 49, 62, 97, 87, 44, 2, 94, 8, and 32 are inserted (in that order) into an initially empty tree.