CS 278	**Analysis of Algorithms**	Test 3
Name:	Summer 2000	Max Pts: 49

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 loose five points for not writing your name.

1. [9 pt] What type of data file will maximize the number of comparisons in selection sort? How about insertion sort and bubble sort? [You have to state the answer in terms of sorted data file, reverse sorted data file, or randomly distributed data file]. Also comment on the stability of each of the three sorting algorithms.

2. [5 pt] About how many comparisons are required, on the average, to find the smallest of N elements using partitioning scheme of quicksort?

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

P R I O * R * * I * T * Y * * * Q U E * * * U * E

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

4. [5 pt] Show the mergesort algorithm on the keys 16, 24, 39, 31, 42, 32, 7, and 33. Can we run mergesort as in-place sort?

5. [10 pt] Demonstrate the insertion of the keys 10, 6, 8, 2, 20, 42, 19, 58, 3, 15 into a hash table using open addressing with linear probing. Let the table have 11 slots, and let the hash function be $h(k) = k \bmod 11$.

6. [10 pt] Draw the top-down 2-3-4 tree built when the keys 10, 6, 8, 2, 20, 42, 19, 58, 3, 15, 252, 401, 398, 330, 344, and 202 are inserted (in that order) into an initially empty tree.