Summer 2008 **CMSC 351: Homework 8** Clyde Kruskal

Due at the start of class Wednesday, July 9, 2008.

**Problem 1.**

(a) Illustrate the operation of radix sort on the following list of English words: RUTS, TOPS, SUNS, SPOT, TONS, OPTS, TORS, ROTS, ROOT, OUTS, SUPS, PUTT

(b) Write an English sentence using both "tor" and "rot" (that indicates you understand the meanings of both words).

**Problem 2.** In class, we solved the selection problem by breaking the list into groups of 5 elements each.

(a) We used the fact that you can find the median of 5 numbers with 10 comparisons (by sorting). It turns out that you can find the median with only 6 comparisons.

  (i) Write down the recurrence for the running time using this new fact. (You can ignore floors and ceilings, as we did in class.)

  (ii) Solve the recurrence.

(b) (i) How may comparisons do you need to find the median of 3 elements? Justify you answer.

  (ii) Write down the recurrence for a selection algorithm based on columns with three elements each. (You can ignore floors and ceilings, as we did in class.)

  (iii) Solve the recurrence.

(c) You need to 10 comparisons to find the median of 7 elements?

  (i) Write down the recurrence for a selection algorithm based on columns with 7 elements each. (You can ignore floors and ceilings, as we did in class.)

  (ii) Solve the recurrence.

(d) What did you learn?

**Problem 3.** Do Exercise 9.3-9 on page 193 of CLRS

**Problem 4. Challenge problem**. Show how to find the median of 5 numbers with only 6 comparisons.