Due at the start of class, Wednesday, June 22.

Problem 1. For this problem you may use a calculator for a few calculations.

Consider $\sum_{k=1}^{100} k^{3/2}$.

(a) Use a non-integral method to show that the sum is between 15,000 and 70,000.

(b) Approximate the sum using integrals. Make sure to get an upper and lower bound.

Problem 2. Assume you have a list of n elements where the first n/k elements are the smallest (but not sorted), the next group of n/k elements are the next smallest (but not sorted), ..., and the last n/k elements are the largest (but not sorted). You may assume k divides n.

(a) Give an algorithm that sorts this list with as few comparisons as possible (as a function of n and k). Just get the high order term right. How many comparisons does your algorithm use?

(b) Show that your algorithm is optimal using a decision tree argument on the *entire* list. (I.e., do not argue that you must solve k independent sorting problems.)

Problem 3.

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

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