Math 475, Problem Set #2
(due 2/2/06)

A. Section 2.4, problem 5.

B. Section 2.4, problem 9. Omit the last sentence.

C. Section 2.4, problem 14.

D. (a) *(fill in the blank)* Find a sequence of __ distinct numbers that contains no increasing subsequence of length 4 or decreasing subsequence of length 5.

(b) *(fill in the blank)* Show that every sequence of __ + 1 distinct numbers must contain either an increasing subsequence of length 4 or a decreasing subsequence of length 5. *(Note: The two numbers that you fill in for parts (a) and (b) must be equal.)*

(c) Formulate and prove a generalization of the Erdös-Szekeres theorem (Brualdi's "Application 9") in which the length of the desired increasing subsequence is $r + 1$ and the length of the desired decreasing subsequence is $s + 1$. Your theorem should contain both the Erdös-Szekeres theorem and part (b) of this problem as special cases.

E. Given 11 real numbers represented as infinite decimals, show that two of them must agree at infinitely many decimal places.