Homework #4 -- due Monday, 16 February 2009 *** turn in just starred (*) questions ***

Exercise at the end of Chapter 2: 13*(also do quadratic), 14, 15*

Exercises at the end of Chapter 3: 1, 2, 3, 9*, 10

Exercise at the end of Appendix B: B.3*
Do this two ways: a) using Lagrange multipliers, and b) solve for $x_1$in terms of x_2 (or vice versa) and then minimize with respect to one variable.

0) Orthogonal polynomial contrasts arise in experiments where a dosage group is defined by equally spaced dosage levels. These polynomial contrasts are used to test if the response follows a low order polynomial, usually linear or quadratic. In textbooks (e.g. Steel, Torrie & Dickey, p. 390), they usually appear in a table as a list of signed integers, and a sum of squares. See Section 2.4 on Gram-Schmidt, and especially the SAS handout.

Construct orthogonal constrasts for a given value of N using the following approach. Construct x0 $=$ 1, x1 $=$ i, x2 $=$ i^2, ..., xk $=$ i^k, up to k $=$ 4, and i $=$ 1, ..., N. Then regress (use PROC REG) xk on 1 (intercept), x1, ..., x(k-1) and look at the residuals. Take the smallest residual in absolute value and rescale all of them so that the smallest one is $\pm$ 1. The 'sum of squares' in the table should be your SSE/(smallest)^2.