Stat 482 Homework Set #8

1. We are interested in modeling the relationship among the predictor variables for the body fat example. Specifically, we wish to model midarm circumference (w) as a function of triceps skinfold thickness (x_1) and thigh circumference (x_2). Refer to the data from Table 7.1. The data for x_1 is listed in the first column, x_2 is listed in the second column, and w is listed in the third column. We are not interested in the body fat measurements, listed in the fourth column, for this problem.

(a) Compute the correlation matrix for w, x_1, x_2.
(b) Test for a marginal effect of x_2 on w against a model which includes no other input variables. (Compute the test statistic and p-value.) Provide an interpretation of the result, stated in the context of the problem.
(c) Test for a partial effect of x_2 on w against a model which includes x_1. (Compute the test statistic and p-value.) Provide an interpretation of the result, stated in the context of the problem.
(d) Fit the regression model for w which includes both x_1 and x_2.
(e) What feature of multidimensional modeling is illustrated in this problem?

2. A small scale experiment is conducted to investigate the relationship between crew productivity (y), and crew size (x_1) and bonus pay (x_2). Refer to the data from Table 7.6.
(a) Provide a definition for an orthogonal design. Discuss an advantage to using an orthogonal design.
(b) Fit a multiple regression model using coded inputs. Compute the coefficient estimate b_l, the standard error $SE(b_l)$, the t- statistic, and the p-value, for each of the coded input variables.