STA 580 — Fall 2008 — Dr. Charnigo

Written Assignment 6

This assignment is due on Thursday 11 December at 4:55 p.m. and is to be handed in to Ms. Thaxton directly. You may work in self-selected groups of two or three, in which case you may hand in one copy of the assignment for the group.

[70] 1. In Lecture 7 we examined the data set {FEV.xls} to determine whether forced expiratory volume might be associated with smoking. Now you will examine this data set to determine whether forced expiratory volume is associated with height. Let X denote height and Y denote forced expiratory volume. Consider a linear regression model of the form

$$Y_i = \alpha + \beta x_i + \epsilon_i.$$

You may proceed as if the ϵ_i were independent normal random variables with mean 0 and unknown but common variance σ^2.

[10] a. Report the least squares estimates of α and β.

[10] b. Report 95% confidence intervals for α and β.

[10] c. Test $H_0 : \beta = 0$ by constructing an ANOVA table and calculating an f statistic.

[10] d. Test $H_0 : \beta = 0$ by calculating a t statistic based on the least squares estimate of β.

[10] e. Suppose that forced expiratory volume will be measured tomorrow for a child whose height is 4 feet 9 inches. Report a 95% prediction interval for the forced expiratory volume for this child.

[10] f. Report a 95% confidence interval for the average forced expiratory volume among all children of height 4 feet 9 inches.

[10] g. What fraction of the variability in forced expiratory volume is accounted for by height? How does this fraction relate to the Pearson correlation between X and Y?

[30] 2. Reconsider "Renal Disease" on page 451, previously the subject of an exercise in Written Assignment 4.

[10] a. Report point and (95%) interval estimates for the risk difference (risk of dying during the next 19 years if taking phenatecin-containing analgesics minus risk if not).

[10] b. Report point and (95%) interval estimates for the relative risk (risk of dying during the next 19 years if taking phenatecin-containing analgesics divided by risk if not).

[10] c. Report point and (95%) interval estimates for the odds ratio (odds of dying during the next 19 years if taking phenatecin-containing analgesics divided by odds if not).