STA 580 — Spring 2009 — Dr. Charnigo

Written Assignment 6

This assignment is due on Thursday 30 April at 5:20 p.m. 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 age. Let X denote age 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 who is 11 years old. Report a 95% prediction interval for the forced expiratory volume of this child.

[10] f. Report a 95% confidence interval for the average forced expiratory volume among all children who are 11 years old.

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

[30] 2. Reconsider "Sexually Transmitted Disease" on page 450, previously the subject of an exercise in Written Assignment 4.

[10] a. Report point and (95%) interval estimates for the risk difference (risk of positive test on pencillin minus risk of positive test on spectinomycin).

[10] b. Report point and (95%) interval estimates for the relative risk (risk of positive test on pencillin divided by risk of positive test on spectinomycin).

[10] c. Report point and (95%) interval estimates for the odds ratio (odds of positive test on pencillin divided by odds of positive test on spectinomycin).