STA 580 — Spring 2009 — Dr. Charnigo

Written Assignment 2

This assignment is due on Thursday 19 February 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.

[50] 1. Refer to {Sheet1} of {FEVModified.xls}, with which you have already worked in Written Assignment 1. Let μ and σ denote the population mean and standard deviation of forced expiratory volume among smoking adolescents.

[10] a. Construct a 95% confidence interval for μ, treating the sample size as "small" and assuming that forced expiratory volume is normally distributed among smoking adolescents. How could you check whether the normality assumption seemed reasonable? [Note: You do not actually have to perform the check.]

[10] b. Consider testing $H_0 : \mu = 3.50$ against $H_1 : \mu \neq 3.50$ at significance level $\alpha = 0.05$. Based on your answer to a, does your intuition suggest that the null hypothesis will be rejected? Carry out the hypothesis test and see whether the result accords with your intuition.

[10] c. What power would you have to conduct the test in part b if the sample size (number of smoking adolescents) were 50?

[10] d. What sample size (number of smoking adolescents) would provide 80% power to conduct the test in part b?

[10] e. Construct a 95% confidence interval for σ^2, assuming that forced expiratory volume is normally distributed among smoking adolescents. Indicate whether and explain why you could or could not abandon the normality assumption if the sample size were 500.

[50] 2. Refer to sheet {Data} of {Diabetes.xls}. The variables contained therein are described in sheet {Information} of {DiabetesInfo.xls}. Let μ denote the mean diastolic blood pressure in the population of which the sample is representative. Let p denote the population proportion of individuals for whom diastolic blood pressure exceeds 80.

[10] a. Construct a 95% confidence interval for μ, treating the sample size as "large".

[10] b. Test $H_0 : \mu = 70$ against $H_1 : \mu > 70$ at significance level $\alpha = 0.05$.

[10] c. What power would you have to conduct the test in part b if the sample size were 400?

[10] d. What sample size would provide 90% power to conduct the test in part b?

[10] e. Construct a 95% confidence interval for p, treating the sample size as "large". Indicate whether and explain why the sample size should or should not be regarded as "large" in this instance.