# STA 580 — Spring 2011 — Dr. Charnigo

## Written Assignment 2

This assignment is due on Thursday 17 February at 5:30 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 {SBPandExercise.xls}, with which you have already worked in Written Assignment 1. Let $\mu$ and $\sigma$ denote the mean and standard deviation of systolic blood pressure within the population of non-exercising adults.

[10] a. Calculate a 95% confidence interval for $\mu$, treating the sample size as “small”. What assumption have you made about the distribution of systolic blood pressure measurements within the population of non-exercising adults?

[10] b. Proceeding with the assumption made in part a, test $H_0 : \mu = 140$ against $H_1 : \mu > 140$ at significance level $\alpha = 0.05$. If $H_1$ is true and the assumption in part a is correct, what can you say about the proportion of hypertensive individuals within the population of non-exercising adults? [Remark: In Lecture 6 you will learn how to test null and alternative hypotheses for such a proportion directly, without making any assumption about the distribution of any underlying numerical measurements.]

[10] c. What power would you have to conduct the test in part b if the sample size (number of non-exercising adults) were 30?

[10] d. What sample size (number of non-exercising adults) would provide 90% power to conduct the test in part b?

[10] e. Calculate a 95% confidence interval for $\sigma^2$, assuming that systolic blood pressure measurements are normally distributed within the population of non-exercising adults. Then take square roots to obtain a 95% confidence interval for $\sigma$.

[50] 2. Refer to sheet {Data} of {Diabetes.xls}. The variables contained therein are described in sheet {Information} of {DiabetesInfo.xls}. Let $\mu$ denote the mean body mass index in the population of which the sample is representative. Let $p$ denote the population proportion of individuals for whom body mass index exceeds 30.

[10] a. Calculate a 90% confidence interval for $\mu$, treating the sample size as “large”. Is this narrower or wider than a 95% confidence interval for $\mu$? [Remark: You can answer the question without explicitly calculating a 95% confidence interval for $\mu$.]

[10] b. Test $H_0 : \mu = 25$ against $H_1 : \mu \neq 25$ 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 100?

[10] d. Consider the problem of finding a sample size that would provide 80% power to conduct the test in part b. Use part c to “predict” whether this sample size would be less than 100 or greater than 100. Then verify your “prediction” through explicit calculation.

[10] e. Calculate a 95% confidence interval for $p$, treating the sample size as “large”.