Assignment 5. One Sample Mean Tests. Due Thursday, November 1 at 3PM

IMPORTANT: For each problem, state your null and research hypotheses <u>in words</u> as well as using <u>formal notation</u>. Then go through the steps of the test, and state your <u>formal conclusion</u> with regard to the null hypothesis as well as your <u>substantive answer</u> to the question. After reading the substantive conclusion, assess the probability of Type I and Type II error.

1. From a national study, we know that Americans watch TV on average 3.1 hours per day. You are interested in finding out whether Boston College students differ from all Americans as a whole in their TV viewing habits. You collect data from a random sample of 20 BC students and get a mean of 2.3 and a standard deviation of 2.9. Using 90% confidence level, can we conclude that BC students have TV viewing habits that diverge from those of U.S. population as a whole?

2. What is the probability that you made a Type I error in this problem? If you did the same test (with the same mean, same standard deviation and same confidence level), but using a random sample of 40 BC students, what would be the probability of making Type I error for that test (do not conduct the test, discuss hypothetically)? What about the probability of Type II error—would it be higher or lower in this case as compared to problem #1, and why?

3. Do the same problem (#1) again assuming the sample size is 40 students. Describe how the results differ. Make sure to discuss the probability of Type I and Type II error.

4. A typical common cold lasts on average 8.5 days. You are investigating a new treatment, expecting that it will be able to <u>reduce</u> the duration of a cold. You have a group of 50 volunteers who are willing to try out that new treatment when they have a cold. For these people, the average duration of the cold turns out to be 7.6 days, with a standard deviation of 3.9 days. Can you conclude that your treatment is effective? Use 95% confidence level for this assessment. After conducting the test, please discuss the probability of Type I and Type II error for this test.

5. Use Stata for this problem. Please do not forget to open and then print your log file and submit it with this assignment sheet.

We know that in 2004, Americans watched 2.9 hours of TV per day on average. Use *tvhours* variable in GSS 2012 data to test whether the average number of hours of TV watching per day in 2012 differs from 2004. Use 99% confidence level for this assessment. State your null and research hypotheses in words as well as using formal notation. After finishing the test, state your formal conclusion with regard to the null hypothesis as well as your substantive answer to the question. In addition, discuss the probability of Type I and Type II error for this test.