ADA1

Assignment 2: Due Sep 13 Thursday in class

Problem 1. Try to understand rcode from Handout2 under "Illustration of Central Limit Theorem, exponential distribution". Run it and turn in the output graphs.

Problem 2. **Please do problem 2 by hand, make sure that you write down necessary steps. You can use R to check your answers, but don't hand in R work for this problem.**
The following data are the total cholesterol levels (TCL) for a sample of 14 young adult males (aged 25 years or less) on the Kaiser Health plan in California:

```
TCL
227
239
221
213
218
246
218
224
210
204
197
229
220
197
```

Suppose it is believed that the mean TCL of all adult males in the United States is 210. Is it plausible the (population) mean TCL of all young adult males on the Kaiser plan is the same as the U.S. male population mean TCL? Test at the 5% level.

a. Define the population parameter in context.

b. Clearly state the hypotheses in notation and in words, is this a two sided test or one sided?

c. Assess the normality assumption of the population (this needs to use R graphs).

d. Derive the CI and interpret the CI in context.

e. Derive the test statistic, perform the t test, what did you conclude from the test? Is it consistent with the CI observation?

Problem 3. A bearing used in an automotive application is supposed to have a nominal inside diameter of 1.5 inches. A random sample of 25 bearings is selected and the average inside diameter of these bearings is 1.4975 inches and the sample standard deviation is 0.01 inches.

a. Is there evidence, at the significance level of .01, that the nominal inside diameter is less than 1.5 inches?

b. What is the p-value of the test?

Problem 4. **Do this problem by R** In the acid data, the first column is the concentration values called "conc", these are the results of a titration to determine the acidity of a solution in a chemistry class. The second column experiment "exper" are with two different kinds of acid, called "Acid1" (124 rows) and "Acid2". In this problem, we only consider "Acid1" experiment.

Download data acid.txt from my website, read in the data into R by using the following code

```
d1<-read.table(file="C:/jenn/teaching/ADA1/data/acid.txt",header=T)
#make sure that you use your own path, not my path
#header=T : data has headline
dnew<-d1[which(d1[,2]==''Acid1''),]
#define a new data set ''dnew", in which "exper" are only with Acid1
#new data should have 124 rows
```

The instructor knew in both cases that the correct value for this solution was 0.110. Use a test of hypothesis and corresponding CIs at significance level $\alpha = 0.05$ to see if the class is consistent with the instructor's solution.