# STAT511 HW #5

**Reading:** Read Chapters 6 and 7 of Ott & Longnecker.
**See Canvas Calendar for due date.**
20 points total, 2 points per problem part unless otherwise noted.

1. Refer to Problem 6.42 which deals with lung capacity of rats exposed to ozone. Note: For consistency, please calculate the differences as After – Before where needed.
    A. Calculate the mean and standard deviation for Before and After (separately).
    B. Are the differences (After – Before for each rat) normally distributed? Support your answer by including a qqplot of differences in your assignment.
    C. Is there sufficient evidence to support the research hypothesis that there is a <u>difference</u> in average lung capacity after ozone exposure? Use the paired t-test with $\alpha$=0.05. Give the hypotheses, test statistic, p-value and conclusion. (**4 pts**)
    D. Rerun the test from the previous question using the Wilcoxon Paired (Signed Rank) test. Give your p-value and conclusion. Use the wilcoxsign_test() function from the coin package with distribution = "exact".

2. Refer to problem 7.9 which deals with rebound coefficients of baseballs. The summary statistics are provided here for your convenience: n = 40, $\bar{y}$ = 84.798, s = 2.684. The raw data is also available from the Ott & Longnecker companion site as "exp07-9.txt". Note that Table 7 (chi-square) does not have information for df = 39, so use the qchisq() R function to calculate table values needed for parts C and D.
    A. Construct a boxplot of the data and include it in your assignment.
    B. Using $\alpha$**=0.01,** test $H_0$: $\mu \geq 85$ vs $H_A$: $\mu < 85$. Give the one-sided p-value and conclusion.
    C. Construct a **99%** CI for $\sigma$. Note: provide a standard "two-sided" CI here.
    D. Using $\alpha$**=0.01**, test $H_0$: $\sigma \leq 2$ vs $H_A$: $\sigma > 2$. Give your test statistic, rejection rule and conclusion. (**4 pts)**