Homework 1 (due Monday March 26)

1. Using the data provided on moodle, reproduce Figures 2.1, 2.2, 2.3 (no need to draw the boxes, just the values), 2.7, 2.8, 2.10 (skip (b))
2. Using MATLAB's random number generator, run the following experiment:
   a. Generate n=48 iid U(0,1) r.v.'s
   b. Find sample mean, sample std dev and 95%-confidence interval for the mean
   c. Repeat the experiment independently for 1000 times, and find how many times the confidence interval does not contain the true value of the mean; plot the results ordering the interval by increasing lower extreme of the CI; comment
3. (difficult)Prove that, for n U(0,1) r.v.'s, we have $\mathbb{E}(U_{(j)}) = \frac{j}{n+1}$
4. Using MATLAB's random number generator, run the following experiment
   a. Generate n iid U(0,1) r.v.'s, and compute sample mean and sample variance
   b. Study the accuracy of the estimate with respect to the true value vs. n
   c. Find confidence intervals for the variance vs. n
   d. Find 95% prediction interval using theory and using bootstrap
5. Redo 2 and 4 for N(0,1)