Statistics Homework, Part I

This homework is to get you to look at some basic ideas. You may use the internet or other materials to answer the questions.

For each topic below, give a definition and two non-trivial examples. Write up your answers and turn them in on **Thursday, September 18** at the beginning of class.

1. Histogram (and frequency plot)

2. Stem-and-leaf display

3. Sample Mean

4. Sample Variance

5. First, Second, Third Quartiles

6. Box-and-Whisker plot (or diagram)

7. The Sample Covariance

8. The Sample Correlation Coefficient

9. Computational questions: Let X, Y be sets of real numbers that will represent two data sets (ordered by index):

$$X = \{x_1, x_2, \ldots, x_n\} \qquad Y = \{y_1, y_2, \ldots, y_n\}$$

   (a) Show (using your formula in (3)) that the mean of aX is a times the mean of X (where aX is the set $\{ax_1, ax_2, \ldots, ax_n\}$).

   (b) Show that adding a constant c to every data point in X shifts the sample mean by c.

   (c) Show that the sample variance of $aX + c$ is a^2 times the variance of X.

   (d) If X and Y are the same, what is the covariance? What is the correlation coefficient? What if $y_i = mx_i$?