Class summary/homework 6 – Due Friday April 11th, 2014 9:00am

(1) I uploaded the scripts class17a.R class17b.R. These scripts need four station data files

data/NY/USW00014735_tavg_mon_mean_ano.csv data/NY/USW00014750_tavg_mon_mean_ano.csv data/NY/USW00014771_tavg_mon_mean_ano.csv data/NY/USW00094728_tavg_mon_mean_ano.csv

If you don't have these station data anomaly files yet, download the month mean data files from the web page http://www.atmos.albany.edu/facstaff/timm/ATM315spring14/R/ and use climatology.R (plot_climatology.R) to create the anomaly files.

- 1) Download & run class17a.R and summarize what the program is doing:
 - a. What statistical values are calculated?
 - b. What general statistical behavior of variances of random variables is demonstrated here by the example of four temperature time series?
 (remember the class where the variance of a sum of random variables was presented)
 - c. Take notes of the printed variance and covariances for part (3).
- 2) Describe in mathematical form and in your own words the key matrix operations:
 - a. Addition of two matrices
 - b. Multiplication of matrix with a scalar
 - c. Transpose of a matrix
 - d. Matrix multiplication
- 3) Download & run class17b.R and summarize what the program is doing:
 - a. Identify the part of code where a matrix is created, where the entries are filled with the temperature data, and where a matrix multiplication is done (a brief paragraph).
 - b. What is the size of the resulting covariance matrix and what do you observe about the entries in the covariance matrix (compare with the values from class17b.R)
- 4) Run class18.R script and briefly summarize the matrix operations:
 - a. How do they change the scatter plots of the random samples?
 - b. Was there something surprising unexpected happening?

Suggested reading:

"The Art of R Programming": sections 3.1, 3.2.1, 3.2.2

http://en.wikipedia.org/wiki/Matrix_%28mathematics%29 (Matrix (Mathematics))

<u>http://www.kaspercpa.com/statisticalreview.htm</u> (A rather unusual source for a good summary of statistical formulas. note that the proof of such formulas, you can find for free in mathematical statistics books in the library ;-)