Homework 1, Stat 221, due Tue Jan 24, in the beginning of class.

1. List the names and email addresses of two other students in this course.

2. From the textbook, problems 1.3, 1.10, 1.19, 1.20, and 1.26 in the 2nd edition, or 1.3, 1.10, 1.20, 1.21, and 1.27 in the 3rd edition.

On problem 1.10, where it says "and autocorrelation function $\gamma(h)$ at some time in the future", it should say "and autocovariance function $\gamma(h)$ at some time in the future".

If you have the 3rd edition and would prefer, you can choose instead to do 1.19 instead of 1.21. Assume $n > 1$ for this problem.

1.19 in the 3rd edition is

Suppose $x_1,...,x_n$ is a sample from the process $x_t = \mu + w_t - .8w_{t-1}$,

where $w_t \sim wn(0, \sigma_w^2)$.

(a) Show that mean function is $E(x_t) = \mu$.

(b) Use (1.33) to calculate the standard error of the sample mean for estimating μ.

(c) Compare (b) to the case where x_t is white noise and show that (b) is smaller. Explain the result.

1.27 in the 3rd edition is 1.26 in the 2nd edition. It is

1.27. A concept used in geostatistics, see Journel and Huijbregts (1978) or Cressie (1993), is that of the variogram, defined for a spatial process x_s, $s = (s_1,s_2)$, for $s_1,s_2 = 0,\pm 1,\pm 2,...$, as

$V_x(h) = 1/2\, E[(x_{s+h} - x_s)^2]$,

where $h = (h_1, h_2)$, for $h_1, h_2 = 0, \pm 1, \pm 2, ...$ Show that, for a stationary process, the variogram and autocovariance functions can be related through

$V_x(h) = \gamma(0) - \gamma(h)$, where $\gamma(h)$ is the usual lag h covariance function and $0 = (0, 0)$. Note the easy extension to any spatial dimension.