Statistics 153 Fall 2005. HW #1

1. Let $E(x_i) = \mu, i = 1, \ldots, n$. Show $E(\bar{X}) = \mu$, where $\bar{X} = n^{-1} \sum_{i=1}^{n} x_i$. Does the result depend on x_i being an iid sample?

2. Let $x_i \sim N(\mu_i, \sigma^2)$, with $cov(x_i, x_j) = 0, i \neq j$. What distribution does $\bar{X} = n^{-1} \sum_{i=1}^{n} x_i$ have?

3. The following R-code will generate 100 data points for an AR(1) process: $x_t = \phi x_{t-1} + w_t$, $w_t \sim \; iid \; N(0,1)$:

   ```
   x = rep(0,100)
   phi = .9
   for(i in 2:100)
   {
   x[i] = phi*x[i-1] + rnorm(1)
   }
   ```

   Generate two times series: one with phi = .9 and another with phi=-.9. Plot the series. Be sure to title the graphs and label the axes. Describe the different behavior of the series for the two choices of phi.

4. Problem 1.7, p79.

5. Problem 1.9, p80.