Assignment 1 (Group Work)
Due date: March 5, 2008 at 13:30
A group of two will submit one set of HW.

1. Identify the following models as ARMA(p,q) models. Assume $Z_t \sim \text{WN}(0, \sigma^2)$
   
a. $X_t = 0.80X_{t-1} - 0.15X_{t-2} + Z_t - 0.30Z_{t-1}$
   
b. $X_t = X_{t-1} - 0.50X_{t-2} + Z_t - Z_{t-1}$

2. Let $X_t$ represent an AR(1) model below
   
   $X_t = 11.45 + 0.43X_{t-1} + Z_t$

   where $E[Z_t] = 0$ and $\text{Var}(Z_t) = 32.5$. Assuming this is the true model, find the forecasts over a two period and estimate the 95% prediction interval. Assume $Z_t \sim \text{WN}(0, \sigma^2)$

3. Find $E(X_t)$ and $\gamma(h)$ for each of the following models. Assume $Z_t \sim \text{WN}(0, \sigma^2)$
   
a. $X_t = Z_t + \frac{1}{3}Z_{t-1}$
   
b. $X_t = Z_t + 3Z_{t-1}$
   
c. Can we distinguish these two models on the basis of observation of $X_t$?

4. Let $Z_t \sim \text{WN}(0, \sigma^2)$ and $X_t = \mu + Z_t + 0.4Z_{t-1} + 0.4^2Z_{t-2} + ...$
   
   Find the variance of the series.

5. Determine the stationarity and invertibility condition of these following models:
   
a. $(1-0.8B)(X_t-\mu) = Z_t$
   
b. $X_t = 0.8X_{t-1} - 0.1X_{t-2} + Z_t$

   where $Z_t \sim \text{WN}(0, \sigma^2)$