Homework Assignment 5

Deadline: March 2, 11:59 pm

1. For each of the following, identify it as an ARIMA model. That is, find the values of p, d and q and the values of the parameters (ϕ's and θ's). Recall that by definition ARMA(p, q) models must be stationary and invertible.

   (a) $Y_t = 0.6Y_{t-1} + 0.4Y_{t-2} + e_t - 0.5e_t + 0.25e_{t-2}$

   (b) $Y_t = 2Y_{t-1} - Y_{t-2} + e_t$

   (c) $Y_t = 0.5Y_{t-1} - 0.5Y_{t-2} + e_t - 0.1e_{t-1}$

2. For each ARIMA model described in Question 1, find the numerical values of $\psi_0, \psi_1, \psi_2, \psi_3, \psi_4$, and a recurrence relation for $\psi_k,\ k > 4$.

3. Consider a stationary process $\{Y_t\}$. Show that if $\rho_1 < 0.5$ then ∇Y_t has a larger variance than Y_t.

4. The data set `gold` from the `TSA` library contains the daily price of gold for 252 trading days in 2005.

   (a) Construct a time series plot of the price of gold Y_t. What are the interesting features of this process?

   (b) Let $W_t = \nabla(\ln Y_t)$, the differences of the logarithms. Construct a time series plot of W_t. Does it look stationary?

   (c) Use the sample ACF to investigate whether W_t is a white noise process.

   (d) Investigate whether W_t is a normal white noise process.