Elena Pesavento
Department of Economics
Emory University

Office: Rich Building 318
E-mail: epesave@@emory.edu

Problem Set #2

1. Suppose that
$$y_t = x_t + e_t$$
$$x_t = \alpha x_{t-1} + u_t$$
where e_t and u_t are mutually independent zero mean i.i.d. processes. Show that y_t is an $ARMA(1,1)$ process.

2. Take the model
$$\alpha(L)y_t = u_t$$
$$\beta(L)u_t = e_t$$
where $\alpha(L)$ and $\beta(L)$ are polynomials of order p and q.respectively. Show that this implies $\gamma(L)y_t = e_t$ for some polynomial $\gamma(L)$. What is the order of $\gamma(L)$?

3. Take the quarterly series pnfix (non residential real private fixed investment).
   (a) Transform the series into quarterly growth rates
   (b) Estimate an AR(4) model. Report using hetereskedastic- consistent standard errors.
   (c) Repeat using the Newey-West standard errors, using M = 5
   (d) Comment on the magnitude and interpretation of the coefficients
   (e) Calculate, numerically, the impulse response function for j = $1, 2, \ldots 10$.

4. Bonus question (optional). This question is hard. Hint: look on page 102 of Hamilton but try on your own first.Suppose that
$$y_t = u_t + e_t$$
$$u_t = v_t + \theta v_{t-1}$$
where u_t and e_t are mutually independent i.i.d. zero mean processes. Show that y_t is a $MA(1)$ process $y_t = \eta_t + \psi\eta_{t-1}$ for an i.i.d. error η_t. Find an expression for ψ