

**ECG752 - Time Series Econometrics - Spring 2009**  
**Instructor: Denis Pelletier**  
**Computer Exercise 1**

**Question 1.** Take the following two Matlab files from the course's website, `main_problem1_q1.m` and `ar1.m`. The first file is the one you would execute in Matlab and the second file contains a function named `ar1`, which is called in the first Matlab file.

1. Look at this code and explain what it is doing.
2. Do the results we get by running this code is what we would expect? Explain.

**Question 2.** The data series for this question is the seasonally adjusted monthly consumer price index (CPI) for the US from January 1947 through December 2006. The series can be downloaded from the course's website.

Let  $x_t$  denote the natural logarithm of the CPI and  $y_t$  denote its first difference multiplied by 100, that is  $y_t = 100(x_t - x_{t-1})$ .

1. Calculate the autocorrelation and partial autocorrelation functions of  $x_t$  up to lag 15. Do these functions look like those of a stationary invertible  $ARMA(p, q)$  process? Briefly justify your answer.
2. Calculate the autocorrelation and partial autocorrelation functions of  $y_t$  up to lag 15. Do these functions look like those of a stationary invertible  $ARMA(p, q)$  process? If so then what values of  $p$  and  $q$  do these functions suggest? Briefly justify your answer.
3. Estimate an  $ARMA(1,1)$  model for  $y_t$  and summarize the results. Be sure to impose constraints on your model so that it is stationary and invertible. Does the model appear well specified? Briefly justify your answer.