Raquel Prado
Applied Mathematics and Statistics
AMS-223. Winter 2017

Name: _____

Homework #3

DUE DATE: Thursday 02/23.

1. Let $f(\omega)$ be the spectral density and $\gamma(h)$ be the autocovariance function of a stationary process with finite moments. Then,

$$f(\omega) = \frac{1}{2\pi} \sum_{h=-\infty}^{\infty} e^{-ih\omega} \gamma(h).$$

   Using this proof the following:

   (a) The spectral density of an AR(1) process with AR parameter ϕ and variance v is

$$f(\omega) = \frac{v}{2\pi} \frac{1}{(1 + \phi^2 - 2\phi\cos(\omega))}.$$

   (b) The spectral density of a MA(1) process with MA parameter θ and variance v is

$$f(\omega) = \frac{v}{2\pi}(1 + \theta^2 - 2\theta\cos(\theta)).$$

   (c) The spectral density of an AR(2) process with AR parameters ϕ_1 and ϕ_2 and variance v is

$$f(\omega) = \frac{v}{2\pi} \frac{1}{[1 + \phi_1^2 + 2\phi_2 + \phi_2^2 + 2(\phi_1\phi_2 - \phi_1)\cos(\omega) - 4\phi_2\cos^2(\omega)]}.$$

2. Problem 3, Chapter 3 P&W (data set available online).

3. Problem 3, Chapter 4 P&W (data available in R (`lh`)).

4. Problem 6, Chapter 3 P&W.

5. Problem 1, Chapter 4 P&W.

6. Problem 2, Chapter 4 P&W.

7. West and Harrison:

   (a) Chapter 2, problem 1.

   (b) Chapter 2, problem 3.

   (c) Chapter 2, problem 5.

   (d) Chapter 2, problem 6.

(e) Chapter 2, problem 21.

(f) Chapter 4, problem 6.

(g) Chapter 4, problem 11.

(h) Chapter 5, problem 1.

(i) Chapter 5, problem 3 (a) and (b).

(j) Chapter 5, problem 4.

(k) Chapter 5, problem 5.

(l) Chapter 5, problem 10.

(m) Chapter 6, problem 1.

(n) Chapter 6, problem 3.

(o) Chapter 6, problem 8.

(p) Chapter 2, problem 21.

8. Petris et al., Problem 4.1.