


**Stat ST485/685, Project 2**  
**Due: Saturday, October 16**

**Analysis of data sets**

1. (36 points)

- (a) Compute 3 distinct **250** point simulations from a MA(1) model (Example 2.2.5) with  $\theta = .8$  and with noise  $\{Z_t\} \sim \text{WN}(0, 1)$ , where  $Z_t$  is distributed as  $N(0, 1)$ .
- (b) For each simulation, plot the time series data with properly labeled axis (so you will have 3 plots).
- (c) For each simulation, plot the sample acf (correlogram) (so you will have 3 plots).
- (d) Compute  $\rho(1)$  for this MA(1) model (see equation (2.2.3)).
- (e) Do the correlograms present evidence consistent with the model? Two points to check: (a) Estimate  $\hat{\rho}(1)$  from the plot and compare to  $\rho(1)$  and (b) For  $h > 1$ , count how many values of  $\hat{\rho}(h)$  are significantly large and compare to the fact that  $\rho(h) = 0$  for  $|h| > 1$ .
- (f) What conclusion do you draw from the variations in your results - why did I have you check results for 3 simulations? 

2. (36 points)

- (a) This experiment involves a AR(1) model (Example 2.2.6) with  $\phi = .99$  and with noise  $\{Z_t\} \sim \text{WN}(0, 1)$ , where  $Z_t$  is distributed as  $N(0, 1)$ .
- (b) Compute a simulation with **46** values, plot the time series data with properly labeled axis and plot the sample acf (correlogram).
- (c) Compute a simulation with **62** values, plot the time series data with properly labeled axis and plot the sample acf (correlogram).
- (d) Compute a simulation with **500** values, plot the time series data with properly labeled axis and plot the sample acf (correlogram).
- (e) Compute the formula for  $\rho(h)$  for this model (see equation (2.2.7)).
- (f) Discuss whether or not the plots of correlogram (from a, b, and c) are consistent with the expected plots of  $\rho(h)$ . Hint: Consider carefully how the values of  $\rho(h)$  decrease as  $h$  increases.
- (g) Provide a potential reason for the results you found. Hint: Consider the discussion starting on the bottom of page 69 in the notes regarding limitations in the computation of  $\hat{\rho}$ .