

STAT 496  
Homework 4 Problems  
due Wed. October 19

5 Problems. Show all work.

Please follow the Lab report directions off the homework web page for R Problems. Please work in HW Groups!

Indicate the leader for each problem. Be sure to switch leaders on Problem 1 and 2.

1. p. 81: 4.5 (a) and (b)

You have already calculated and the ACF for  $k = 0, 1, 2, 3, 4, 5$  lags. Now, calculate the PACF  $\phi_{kk}$  by hand for  $k = 0, 1, 2, 4, 4, 5$  lags. (You can check your calculations by using the R function `ARMAacf` with the `pacf=TRUE` option.) You do not need to sketch the the PACF. (Note: By convention  $\phi_{00} = 1$ .)

2. Similar to Problem 1, but use the following AR(2) model:

$$Y_t = 1.4Y_{t-1} - 0.48Y_{t-2} + e_t$$

where  $\{e_t\}$  is a mean zero white noise process with constant variance  $\sigma_e^2$ .

You have already calculated and the ACF for  $k = 0, 1, 2, 3, 4, 5$  lags for your Exam. Now, you calculate the PACF  $\phi_{kk}$  by hand for  $k = 0, 1, 2, 3, 4, 5$  lags. (You can check your calculations by using the R function `ARMAacf` with the `pacf=TRUE` option.) You do not need to sketch the the PACF. Note: By convention  $\phi_{00} = 1$ .)

3. Use the models in Problem 1 and use the R function `arima` to simulate a time series of length  $n = 500$ . Make a time series plot of the data, sample ACF plot, AND sample PACF. (See the Lab.) You should have 2 simulated datasets. How do the sample PACF functions compare to the ones you calculated in Problem 1? (Note: By convention  $\phi_{00} = 1$  and is not included on the plot)

4. Use the model in Problem 2 and use the R function `arima` to simulate a time series of length  $n = 500$ . Make a time series plot of the data, sample autocorrelation function plot, AND sample PACF. (See the Lab.) You should have one simulated dataset. How does the sample PACF function compare to the one you calculated in Problem 2? (Note: By convention  $\phi_{00} = 1$  and is not included on the plot)

5. p. 146: 6.34