Time Series - HW3

due Fri, Feb 13th

HW must be turned in as physical copy. If you used R, then use MS word to combine your answer, R code and plots. If you have any question, email nmimoto@uakron.edu.

1. Read in the sunspot data directly onto your R by copy and pasting below code onto your R console.

```
Y1 <- read.csv("http://gozips.uakron.edu/~nmimoto/pages/datasets/sunspots.csv",
                                                                    header=F)
Y  <- ts(Y1, start=1770)
plot(Y,type="o")
```

   (a) Find appropreate AR(p) model, using ACF/PACF and AIC. You can use `ar()` function to automatically choose p for smallest AIC.

   (b) Estimate the AR parametes using Yule-Walker estimator in `ar()` function. Should you use `demean=TRUE` option or not? Test each parameter for significance. If you find any parameter to be insignificant, remove, and estimate the remaining parameters.

   (c) Plot residuals after AR fit. plot acf and pacf of the residuals. Are you satisfied with what the plots are showing? Does your AR(p) has good fit? Hint: In R, `X[-c(1,2)]` means omit first two elements in vector `X`.

   (d) Predict 10-year ahead, and plot the prediction, together with the original data with approximate 95% prediction interval.

   (e) Fit AR(3) to the data. Test the Y-W estimated parameters for significance.

   (f) Using AR(3) model, predict 10-year ahead, and plot the prediction, together with the original data with approximate 95% prediction interval.

   (g) Plot residuals after AR fit. plot acf and pacf of the residuals. Are you satisfied with what the plots are showing? Does your AR(p) has good fit? Hint: In R, `X[-c(1,2,3)]` means omit first three elements in vector `X`.

   (h) Which model is better in your mind? Your model in (a), or AR(3) in (f)? Why?

   (i) Output numerical values of 10 predicted points for two models. Use `cbind(A,B)` to put them side by side.