Homework #5 (Optional) Due no later than Thursday, May 2 at 8:00pm

Organize your homework following homework_guidelines.pdf.

The files hw5p1dat.txt and hw5p2dat.txt each contain two columns giving time series X and Y (in that order). This data is available in mordor and also in the course folder in SAS Studio.

The goal of this homework is to determine reasonable transfer function models

$$Y_t = C + \frac{B^b \omega(B)}{\delta(B)} X_t + N_t$$

for these series by the pre-whitening approach. Here N_t denotes an ARIMA(p, d, q) noise process.

For each data set, do the following:

- (a) Describe the ARIMA model you chose for X_t and the transfer function model you chose for Y_t .
- (b) Describe in detail your reasons for choosing these models.
- (c) Turn in **only** the following output from PROC ARIMA. (You might refer to other output in part (b), but do **NOT** include it in this homework.)
 - (1) The IDENTIFY and ESTIMATE output for the model for X used in prewhitening. (This includes the residual diagnostics.)
 - (2) The cross-correlations of the pre-whitened series X and Y.
 - (3) The ESTIMATE output from fitting the initial transfer function model used to identify the noise process.
 - (4) The ESTIMATE output from fitting the final transfer function model including a choice for the noise process.

All of the above output should be annotated. Important parts of the output should be indicated and you should explain what conclusions you draw from this indicated output. Use complete sentences please.

In these series there are no seasonal effects and no transformations are needed.

A fairly typical instance of the PROC ARIMA code which produces the required output is the following:

```
PROC ARIMA DATA=stuff;
I VAR=X(1);
E Q=1 P=3 METHOD=ML NOCONSTANT;
I VAR=Y(1) CROSSCOR=(X(1));
E INPUT=(1$(1)X) METHOD=ML;
E P=2 Q=1 INPUT=(1$(1)X) METHOD=ML NOCONSTANT;
QUIT;
```

Problem 1: Do this for the data in hw5p1dat.txt.

Problem 2: Do this for the data in hw5p2dat.txt.