ECO 5375-701 Prof. Tom Fomby
Eco and Bus Forecasting Fall 2016

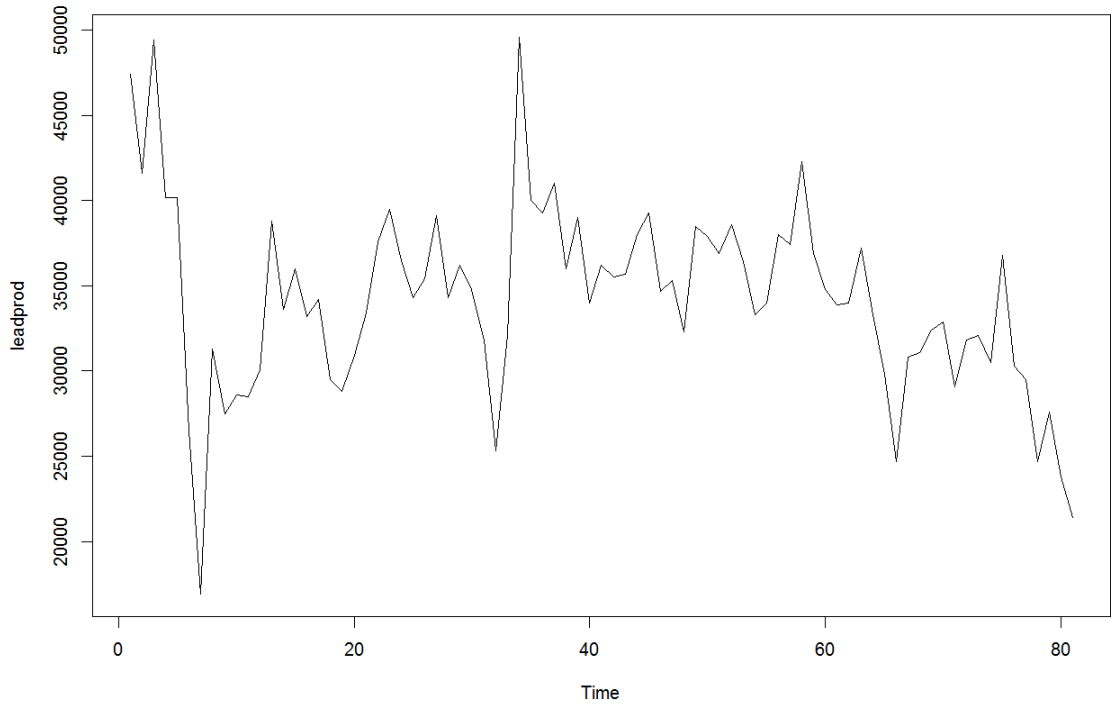
EXERCISE 6
KEY

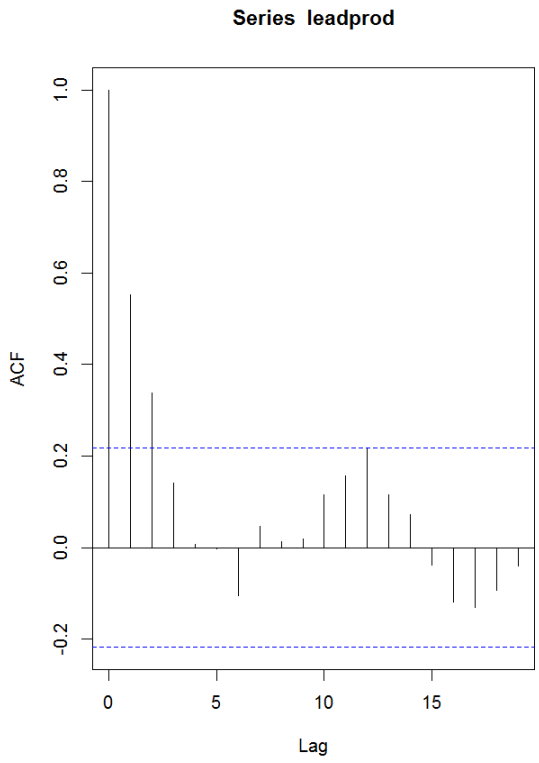
Purpose: To learn how to use R to do just about everything that we did in Exercise 5 where we used the P-Q box and overfitting to determine the best Box-Jenkins model for the Lead Production data. Download the R program **Leadprod.R** from the class website to complete the following tasks required of this exercise. You will need to install the R program on your laptop. To do this go to the website **cran.r-project.org** and follow the instructions there. This homework is due **Thursday, October 6.**

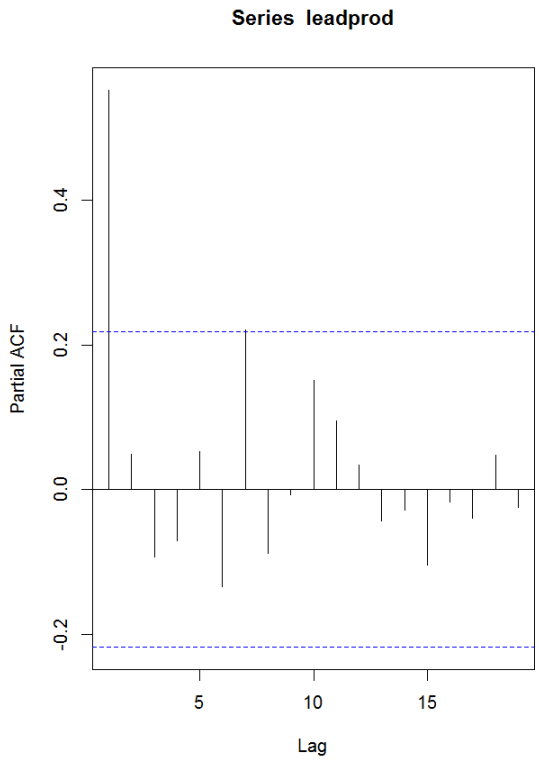
(i) Copy into .jpg files the three graphs that the Leadprod.R program produces, print them out and hand them in with this exercise. These three graphs are (i) a plot of the lead production data, (ii) a plot of the sample ACF and PACF functions associated with the lead production data, and (iii) a plot of the forecasts and their 95% confidence intervals.

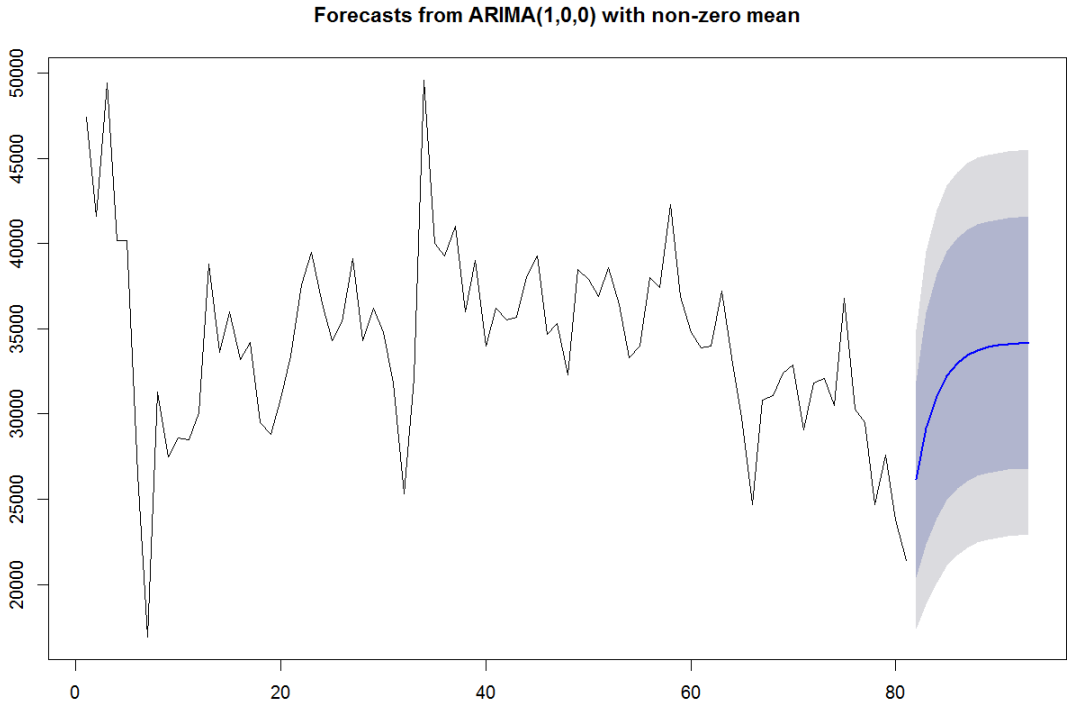
(ii) Report the best Box-Jenkins model determined by the auto.arima function including the coefficient estimates and their standard errors. Write out the model in "intercept" form.

(i) See three graphs below:


leadprod
50000
45000
40000
35000
30000
25000
20000
0
20
40
60
80
Time


Series leadprod
ACF
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
0
5
10
15
Lag


Series leadprod
Partial ACF
0.4
0.2
0.0
-0.2
5
10
15
Lag



(ii) Best model chosen by auto.arima procedure no matter what information criterion was used: AIC, AICC, and BIC.

ARIMA(1,0,0) with non-zero mean

Coefficients:

	ar1	intercept
	0.6284	34231.154
s.e.	0.0944	1312.167

sigma^2 estimated as 20058650: log likelihood=-796.16
AIC=1598.32 AICc=1598.63 BIC=1605.5

Here is the conventional "intercept form" of the chosen AR(1) model:

$$y_t = \underset{(1312.167)}{34231.154} + \underset{(0.0944)}{0.6284}y_{t-1} + \hat{a}_t$$