Econ 3342
Assignment #6

Instructions. Please type your answer key before turning it in. Don't forget to include your name and to include every graph/output that is requested in this activity. MAKE SURE THAT YOUR GRAPHS SHOW YOUR FULL SCREEN AS IN THE PRINTED GRAPHS AT THE END OF THIS ASSIGNMENT. STUDENTS SCREENSHOTS ARE UNIQUE. In Windows, to print your screen you push at the same time **Windows button + PrtScn**. Then just paste in Word.

Go to https://fred.stlouisfed.org/ and search for Real Gross Private Domestic Investment (series gpdIc1). This series is available since 1947q1. Download the data in quarterly frequency as an EXCEL file. Import your files into Eviews. The goal of this exercise is to help you to practice forecasting with trending variables. The variable that you downloaded is not covariance-stationary in levels (it is a growing variable). In the past we studied transformation to the data to make the series stationary (e.g. constructing the growth rates) but in this activity we will be modeling the trending variable directly.

1. Rename the series *Real Gross Domestic Investment (Investment)* as just I. Show the time series for I for the whole period (paste the graph in your homework).

2. Generate a new variable log(Investment) and call it *logI*, show the graph of the timeseries of logI for the whole period.

3. For the period 1947q1 to 2015q4 , we estimate the following linear trend model $logI = \beta_0 + \beta_1 t + u_t$ where t is trend (for the instructions on trend see notes and/or video for chapter 10). Print your output.

4. Follow the instructions in the notes about how to graph your trendline together with the actual series. Print your output.

5. In your regression, interpret the coefficient on the trend. That is, interpret the quantitative measurement of how investment grows over time for the sampled period.

6. Print the correlogram of your residuals (instructions in notes).

7. Your residuals are actually the "detrended" variable, in this case detrended log(investment). As explained in the class videos and in the book, we can apply ARMA methodology on this detrended series. So first rename your current residuals as *det_logI* (**genr det_logI = resid**; alternatively you can generate *det_logI* by subtracting *logI* minus the forecasted values for the same variable in step (4) above). Show both the graph of *det_logI* and the correlogram.

8. Let y_t represent $logI_t$. Estimate the model $y_t = a + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \phi_3 y_{t-3} + \phi_4 y_{t-4} + \phi_5 y_{t-5} + \varepsilon_t$. Print your output and also the correlogram of your residuals of this estimation output (**view, Residual diagnostics, correlogram Q-statistics**).

9. Instead of first estimating a trend (as in step (4) above) and then modeling the ARMA process for the residual (as in step (7)), you can just ask Eviews directly to do that automatically. In Eviews use the following instructions **Quick, Estimate equation**, and then type **logI c @trend ar(1) ar(2) ar(3) ar(4) ar(5)**. For computational reasons the estimates in your output for the AR coefficients might not be identical, but they should be very similar. Print your output.

10. Use a **static forecast** for the period 2016q1 to 2019q4. Call it *logI_F* Then print your forecast (graph produced in eviews that includes some statistics and 95% confidence bands). In another graph put *logI* and logI_F in the same graph (see notes to chapter 10).

11. Now for the same sample 1947q1 2015q4, estimate a model with the following commands: **Quick, Estimate equation**, and then type **logI c @trend ar(1) ar(2) ar(3) ma(1) ma(2)**. Then (i) print

your output and the correlogram of residuals; and (ii) based on compare the AIC and SIC of the new model with the AIC and SIC of the model in step (9) and discuss according to our estimating sample which model should be preferred.

12. With the model above produce a new *static forecast* (you can call your forecasted variable *logi_F2*) for the period 2016q1 2019q4 and print your output. Then determine (and justify) on which of our 1-step ahead forecasts (those of the AR(5) model with trend or the ARMA(3,2) model with trend) is more accurate if our loss function is (i) quadratic, (ii) the absolute value loss function. (see chapter 9 for the evaluation of the forecasts).

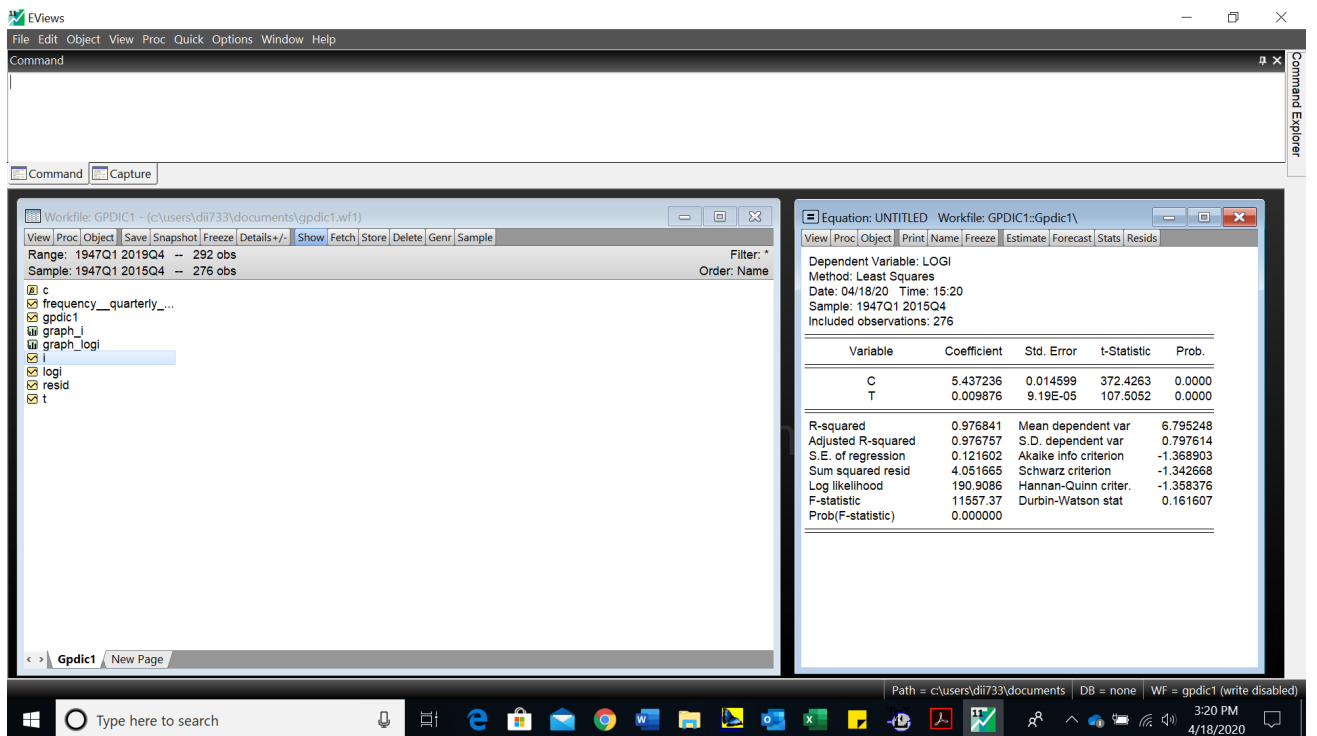**Answers to the first 4 parts of this assignment**
1.

2.

3.

4.