Question:	**1**	**2**	**3**	**4**	**5**	Total
Points:	4	4	4	8	30	50

Justify all your answers. You are required to show your work on each problem on this problem set. **Organize your work**. Work scattered all over the page will receive very little credit. A correct answer in a multiple choice question is worth 4 points; an incorrect one is worth −1 point.

(4) **1**. Which of the following is TRUE.

○ A unit root process cannot have a trend in time.

○ A weakly dependent process cannot have a trend in time.

○ A random walk process has a constant mean.

○ None of the previous statements is correct.

(4) **2**. Consider the following model $y_t = e_t - 0.75e_{t-2}$ with e_t a white noise process with mean zero and variance σ^2. Then, one can conclude that,

○ $Var(y_t) = 0.25\sigma^2$

○ $Cov(y_t, y_{t+1}) = 0$ and $Cov(y_t, y_{t+2}) = -0.75\sigma^2$

○ $Cov(y_t, y_{t+1}) = -0.75\sigma^2$ and $Cov(y_t, y_{t+2}) = 0$

○ $Cov(y_t, y_{t+2}) = -0.75$

(4) **3**. Which of the following is TRUE.

○ A random walk is a weakly dependent process because it has no drift.

○ If a process is not stationary in covariance then it is not weakly dependent.

○ A serially correlated process cannot be weakly dependent.

○ A weakly dependent process shows a mean reversion behavior over time.

4. With a sample of 75 annual observations the following equations were estimated:

$$y_t = 0.32 + 0.09x_t + 0.01x_{t-1} + \hat{u}_t \quad R^2 = 0.721 \quad (1)$$

$$\widehat{\hat{u}_t} = -0.021 + 0.007x_t + -0.001x_{t-1} + 0.214\hat{u}_{t-1} - 0.110\hat{u}_{t-2} \quad R^2 = 0.282$$

(5)   (a) The second equation has the aim to perform a test. Identify that test, write the test hypothesis, and conclude.

(3)   (b) Is model (1) dynamically complete? Justify.

5. Use the data in PS5.wf1 to answer the following questions.

(7.5)   (a) Estimate a model with the logarithm of CO2 emissions, LCO2, as a function of the logarithm of GDP, LGDP. Do not forget to include a trend. Interpret the parameter estimates.

(7.5)   (b) Test the existence of serial correlation of order 1 in the error term of the equation estimated in part a) assuming that LGDP is sequentially exogenous and conclude.

(5)   (c) Given the results obtained in part b) which are the properties of the estimation from part a)?

(5)   (d) Reestimate the model in part a) adding as explanatory variable a lag of LCO2 and test for serial correlation of order 2. What do you conclude?

(5)   (e) Write the condition that states that the model estimated in part e) is dynamically complete.