Unit Roots: Problems

Consider the following time series for #1-4:

$$y_t = y_{t-1} + .5t + u_t \tag{1}$$

1. De-trend this series. Is it now stationary?

2. Make your de-trended variable stationary.

3. What would happen to this time series if you differenced it twice?

4. Suppose you know that this time series depends only on its first lag and a linear ternd. How would you test for non-stationarity?

5. True or False? Dickey Fuller tests are simply t-tests on autoregressive parameters.

6. Suppose that you have a time series, r_t. Assuming a linear trend of 3% per period, construct a de-trended variable $\tilde{r}_t$.

7. Intuitively explain why including a non-stationary variable in your specification will lead to bias.

8. Provide an example, not mentioned in class, where Granger Causality is transparently not actual causality.