Homework 8. Due Wednesday March 27.

1. Assume that random variables y_i for i=1,...,20 are independent with $E(y_i) = \alpha + \beta x_i$, $Var(y_i) = \sigma^2 x_i^2$, where $x_i = i$ and $\sigma^2 = 2$.
a) If you estimate α and β by OLS, what is the variance of $\hat{\beta}$?
b) If you estimate α and β by GLS, what is the variance of $\hat{\beta}$?

2. Computer question (continuation of previous homeworks). In Matlab, regress real per capita U.S. data consumption growth on income growth and the interest rate using the posted dataset. (This is the what you did in homework 1.)

a) You are told that income growth is not exogenous to consumption growth, but lagged income growth is. Suggest a suitable IV estimator. (Just words here.)
b) In Matlab, estimate the coefficients using your suggested IV estimator.
c) Try a different instrument and see if the IV estimate is different.
c) Calculate the standard errors of the coefficients and compare to the estimated standard errors from an OLS regression.
d) Based on the IV estimation, test if the coefficient to income growth is zero.
(NOTE: I mention that you can use the lagged variable here, because you already have it available. It is, or was, rather common to lagged variables used as instruments without much discussion and that is very often not a good idea. So do not take the setup of this problem as a suggestion for doing good empirical economics, but rather as a study of the IV estimator.)