Homework 7. Due Monday April 2.

1. (10% of Spring 2016 Final)
Assume that you want to estimate the model

$$Y_i = \beta_1 X_{1i} + \beta_2 X_{2i} + \epsilon_i ,$$

where X_1 and X_2 are orthogonal regressors.

Assume that you know that the variance $\text{Var}(\epsilon_i) = X_{1i} + 3\ln(X_{2i})$. This is a breakdown of one of the "standard OLS-assumptions."
a) What is the name for the problem?
b) How does it affect the results from OLS estimation: are the $\hat{\beta}$-coefficients biased? are they consistent? is the t-statistic (as usually calculate under the standard assumptions) t-distributed?
The previous part was on the exam. The following part of this subquestion is added:
Show whether the coefficients are unbiased. Extra points (I will get to this more systematically later) if you can find the variance of the estimates).
c) Suggest an efficient estimator. (Write out the formula.)

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) Calculate the residuals, take the absolute value, and regress them on each of the regressors. Do you find evidence of heteroskedasticity? (Use t-tests.)
b) An alternative "test:" plot the residuals against each of the regressors. Do the residuals look homoskedastic?
c) Assume that you are told that the variance of the residuals is proportional to the square of the interest rates. Estimate the relation using the efficient GLS estimator.