Complete the exam, include **all your code and all outputs** from R. Submit your solutions on Blackboard or through email, by 11:59pm Friday March 5th. You are to work completely independently on this exam; however you may use notes, your textbook, etc.

1. (25pt) The EmployeeData data set gives the number of employees (in thousands) for a metal fabricator and one of their primary vendors for each month over a 5-year period. You may find the data in .txt file on blackboard and read the data into R using read.table command.

(a) Fit a simple linear model to the data, where y_t is the number of employees during time period t at the metal fabricator and x_t is the number of employees at the vendor. Report the ANOVA table and summary for the model coefficients.
(b) Plot of the number of employees at the fabricator versus the number of employees at the vendor with the ordinary least squares regression line overlaid.
(c) Plot of the residuals versus t (the time ordering). Does it look random?
(d) Conduct a Durbin-Watson test to determine the correlation in the residuals. Comment on your conclusion.
(e) Use one iteration of the Cochrane-Orcutt procedure to estimated the regression coefficients. Also calculate the standard errors of the coefficients. Are the standard errors (from the Cochrane-Orcutt procedure) larger than the ones from simple linear regression?

2. (25pt) The following analysis are based on the data in HomePrice.txt file on blackboard. You may read the data into R using read.table command. This HomePrice dataset has the following variables:

Y = sale price of home
X_1 = logged square footage of home
X_2 = logged square footage of the lot

(a) Fit an ordinary linear regression model, $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$. Report the ANOVA table and summary for the model coefficients.
(b) Plot of the OLS residuals versus OLS fitted values. Comment on any pattern you see.
(c) Calculate the absolute values of the OLS residuals. Regress the absolute values of the OLS residuals versus the OLS fitted values and store the fitted values from this regression.
(d) Calculate weights equal to $1/\hat{e}^2$, where $\hat{e}$ are the fitted values from the regression in the last step. Using these weights this time in a weighted least squares regression. Report the ANOVA table and summary for the model coefficients.
(e) Plot of the WLS residuals versus WLS fitted values. Does it look random now?