# Economics 8205-8206:
# Applied Econometrics I

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## Assignment 4

Handed out: October 31, 2000
Due: November 14, 2000

**Non-computer problem**

1) (From Greene, Chapter 19, 9.894, problem 4.)

a- Construct the LM statistic for testing the hypothesis that all the slopes (but not the constant term) equal zero in the binomial logit model $y = \{\alpha + \beta X + u\}$, where u has a logistic distribution.

b- Prove that LM=$nR_c^2$ from the regression of $(Y_t - P)$ on the X's, where P is the sample proportion of 1's.

**Computer problems: turn in your source code and results**

2) Logit estimation
Use the Matlab data set assig4_pr2 for this problem.

Consider the model $y = \{X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + u\}$, where u has a logistic distribution.
a- Estimate this model using maximum likelihood.
b- Find the variance/covariance of your parameter estimates using the OPG and Hessian methods. How different are they?
c- Perform a Wald test that $\beta_1 + 2\beta_2 = 0$ using the OPG variance estimator.
d- Perform a LM test that $\beta_1 + 2\beta_2 = 0$ using a (restricted) OPG variance estimator. How different are the test statistics?

3) Comparison of logit, probit and linear probability model
Use the Matlab data set assig4_pr3 for this problem.

Consider the model $y = \{X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + X_4\beta_4 + u\}$.
a- Estimate this model using logit, probit and linear probability models. How do your parameter estimates differ?
b- Consider individuals t=10, 20, 30 and 40. Find the values of $\frac{\partial \Pr(y_t = 1)}{\partial \beta_2}$ for these individuals for all three models. What differences do you find among the models.