Sample Midterm

Econ 573
Professor Bunzel
Thursday, February 15, 2001

You have 65 minutes to write this exam. The exam consists of 3 questions. The maximum possible score is 100 points. If there is any question you do not understand please ask me for clarification. Also remember that partial credit is given.

PLEASE remember to put your name and social security number on the answers!!

GOOD LUCK!!!!!

1. (20 points) Using the standard notation in the linear, OLS framework with non-stochastic regressors, consider the table below. Put a mark in each square that applies. I have filled in the first row to demonstrate how:

	Estimator	Constant	Stochastic variable	Parameter
5		X		
$\hat{\beta}$				
e				
ε				
σ^2				
SSR				
β				
$s^2 (X'X)^{-1}$				

2. (35 points) Consider the least squares residual vector e from the regression of y on X, where the errors ε have variance $V(\varepsilon) = \sigma^2 I$. Assume that X is *not* stochastic. Show that the variance of any element of e, say e_j, is less that or equal to σ^2. Hint: $\{P_X\}_{jj} = X^j (X'X)^{-1} (X^j)'$, where X^j is the $j'th$ ROW of X. Show all steps.

3. (30 points) Data on working men was used to estimate the following equation:

$$educ = 10.36 - 0.094 \cdot sibs + 0.131 \cdot meduc + 0.210 \cdot feduc$$
$$n = 733,\ R^2 = 0.214$$

where *educ* is years of schooling, *sibs* is number of siblings, *meduc* is mother's years of schooling and $feduc$ is father's years of schooling.

   (a) Discuss the interpretation of the coefficient on *sibs*.

   (b) Holding *meduc* and $feduc$ fixed, how much does *sibs* have to increase to reduce the predicted years of schooling by one year?

   (c) Suppose Harvey has no siblings and his parents each have 12 years of schooling. John has no siblings and his parents each have 16 years of schooling. What is the predicted difference in years of schooling between Harvey and John?