

First Exam: Economics 388, Econometrics      Fall 2000 in R. Butler's section

**YOUR NAME:** \_\_\_\_\_

Section I (30 points) Questions 1-10 (3 points each)

Section II (40 points) Questions 11-14 (10 points each)

Section III (30 points) Questions

Section I. Define or explain the following terms (3 points each)

1. 95 percent confidence interval for an estimated slope coefficient-

2. ordinary least squares-

3. panel data-

4. probability density function-

5. the F-distribution-

6. idempotent matrix-

7. sum of squares of residuals-

8. OLS is BLUE-

9. empirical rule for normal distributions-

10. type II error-

## II. Some Concepts

11. The following data gathered from Provo give the joint distribution of  $f(X,Y)$  of per capita disposable income  $X$  (in thousands of dollars) and savings ratio  $Y$ . The cell entries are the proportions for the indicated values of  $X$  and  $Y$ :

	X= 1.5	3.0	4.5	6.0
Y				
.1	.05	.05	.10	.10
0.0	.10	.15	.05	.10
-.1	.20	.05	.05	.00

A. calculate  $f(X)$ ,  $f(Y)$ ,  $E(Y)$  and  $V(Y)$  (no credit unless you show the right formulas).

B. Calculate  $f(X|Y=0.0)$ . What is the conditional mean of  $X$ , given that  $Y=0$ ? (again, no credit unless you show the right formulas)

12. a. Derive the omitted variable bias from leaving out a regressor  $z$ , using matrix algebra, and interpret your results.

13. Prove that the least squares estimator for the variance,  $s^2$ , is unbiased using matrix algebra.

14. List the 5 OLS model assumptions gone over in class (and in the Wooldridge text), and provide a graphical illustration of where each of these assumptions are violated (where they do not hold).

II. 15. Some Applications—A Shazam program with the corresponding output is given below. In the respective places below, indicate what each of the circled statistics mean or implies. This is the major league baseball example mentioned in the Wooldridge text, where

lsalary=log(1993 season salary)  
 years = years in the major leagues  
 gamesyr = games per year in league  
 bavg = career batting average  
 hrunsyr = home runs per year  
 rbisyr = runs batted in per year

```
ols lsalary years gamesyr bavg hrunsyr rbisyr
test
    test bavg=0
    test hrunsyr=0
    test rbisyr=0
end
```

```
R-SQUARE = 0.5916      R-SQUARE ADJUSTED = 0.5854
VARIANCE OF THE ESTIMATE-SIGMA**2 = 0.54240
STANDARD ERROR OF THE ESTIMATE-SIGMA = 0.73648
SUM OF SQUARED ERRORS-SSE= 177.91
MEAN OF DEPENDENT VARIABLE = 13.582
LOG OF THE LIKELIHOOD FUNCTION = -368.735
```

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO	PARTIAL P-VALUE	STANDARDIZED CORR.	ELASTICITY COEFFICIENT	AT MEANS
YEARS	0.67637E-01	0.1235E-01	5.478	0.000	0.290	0.2267	0.0327
GAMESYR	0.12792E-01	0.2869E-02	4.458	0.000	0.239	0.3746	0.0881
BAVG	0.18745E-02	0.1418E-02	1.322	0.187	0.073	0.0523	0.0360
HRUNSYR	0.17026E-01	0.1670E-01	1.020	0.309	0.056	0.1007	0.0094
RBISYR	0.92741E-02	0.7560E-02	1.227	0.221	0.068	0.1802	0.0251
CONSTANT	10.983	0.3718	29.54	0.000	0.853	0.0000	0.8086

```
F STATISTIC = 9.2511980      WITH 3 AND 328 D.F. P-VALUE= 0.00001
WALD CHI-SQUARE STATISTIC = 27.753594      WITH 3 D.F. P-VALUE= 0.00000
UPPER BOUND ON P-VALUE BY CHEBYCHEV INEQUALITY = 0.10809
```

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.