Economics 113 Professor Spearot
Introduction to Econometrics
Fall 2010 – Midterm 2
Name _____   ID_____

Midterm 2 – 70 Points

You must answer all questions. Please write your name on every page. The exam is closed book and closed notes. You may use calculators, but they must not be graphing calculators. Do not use your own scratch paper.

You must show your work to receive full credit

I have neither given nor received unauthorized aid on this examination, nor have I concealed any similar misconduct by others.

*Signature*_____

1. (45 Points) Suppose that you wish to predict wage outcomes via the following specification:

$$wage = \beta_0 + \beta_{drugs}drugs + u$$

wage is measured in dollars per month, and *drugs* (taking on values from 0 to 7) is measured in days of hard drug use per week.

a.) Suppose you estimate $\hat{\beta}_{drugs} = -100$ and $\hat{\sigma}_{drugs} = 5$. What is the covariance between wages and drug use? (5 Points)

b.) Supposing again that $\hat{\beta}_{drugs} = -100$, and further, that $\hat{\mu}_{drugs} = 1$ and $\hat{\mu}_{wage} = \$2,000$. What is the value of $\hat{\beta}_0$? (5 points)

c.) Please state the Gauss-Markov assumptions (5 Points)

d.) "But Dr. Spearot, you should be taking logs of wages and drugs before running your regression. The coefficients from log-log regressions are much easier to interpret!!!!" What is fundamentally wrong with this statement? (5 Points)

e.) In running the regression, I forgot to include *crime*, which is a variable measuring aggregate months spent in prison over the last 5 years. The variable *crime* is positively correlated with *drugs* and negatively correlated with *wage*. In what direction, if any, is the estimate $\hat{\beta}_{drugs}$ biased? Supposing that the original estimate of $\hat{\beta}_{drugs}$ is negative, what can be said about the sign of β_{drugs}? (5 Points)

f.) Suppose that, on average, somebody with *drugs=0* has a positive predicted level of *crime*. Given the information in (e), in what direction, if any is $\hat{\beta}_0$ biased? Supposing that the original estimate of $\hat{\beta}_0$ is positive, what can be said about the sign of the true parameter β_0? (5 Points)

g.) Suppose that the variance of the unobservable is large when *drugs* is low or high, but small when *drugs* in a mid-range. What kind of errors are these? (5 points)

h.) I report that the R^2 for the above regression is 0.65. What does this say about the model? What does this not say about the model? (5 points)

i.) Suppose that I double the size of the sample by replicating all observations once. Does anything related to the estimate $\hat{\beta}_{drugs}$ or its properties change? (5 points)

2. (25 Points) Using a sample of workers in California, I wish to estimate

$$\log(Wealth) = \beta_0 + \beta_{educ}educ + \beta_{exper}exper + u$$

Educ and *Exper* are measured in years and *Wealth* in thousands of dollars.

a.) Suppose you estimate that $\hat{\beta}_{educ} = 0.2$. Please interpret this estimate. (5 Points)

b.) Suppose that we have two individuals with the same predicted values of *Wealth*. The first individual has 12 years of education and 10 years of experience. The second individual has 15 years of education and 7 years of experience. Again assuming that $\hat{\beta}_{educ} = 0.2$, what is the estimate of $\hat{\beta}_{exper}$? (5 Points)

c.) Suppose that the true parameter β_{educ} actually equals 0.15. Given that $\hat{\beta}_{educ} = 0.2$, is this sufficient to conclude that there is a bias in the estimate $\hat{\beta}_{educ}$? If so, what kind of bias is this? If not, why? (5 Points)

d.) Suppose that instead of the above equation, I estimate the following:

$$Wealth = \beta_0 + \beta_{educ} \log(educ) + \beta_{exper} \log(exper) + u$$

Please <u>derive</u> and <u>interpret</u> the coefficient on *log(educ)* (10 Points)