Economics 113 Professor Spearot
Introduction to Econometrics
Winter 2013 – Midterm 2
Name _____ ID_____

Midterm 2 – 50 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. (35 Points) Suppose that you estimate firm profits as a function of capital and labor employed by the firm:

$$\log(Profits) = \beta_0 + \beta_{capital} capital + \beta_{labor} labor + u$$

Profits are operating profits in millions of dollars, *capital* is the value of capital in millions of dollars and *labor* is the number of workers employed.

a.) Using a sample of manufacturing firms, suppose you estimate $\hat{\beta}_{capital} = 0.05$. Please **derive** using derivatives the interpretation for $\hat{\beta}_{capital}$. Please interpret this estimate. (10 Points)

b.) In running the regression, I forgot to include *inputs*. A colleague states that there is an upward bias in the coefficient on *capital*, since "there is a positive relationship between profits and inputs!!!!". What is the missing piece of this statement such that there is an upward bias? (5 Points)

c.) Within our standard regression model, Assumption (4) for unbiasedness requires that $\sigma_x > 0$. Intuitively, why is this required for unbiased estimates? (5 Points)

d.) One of the restrictions on R^2 is that $0 \leq R^2 \leq 1$. Why can't R^2 be greater than 1? (5 points)

e.) The population of manufacturing firms includes values of Profits between -10 million and 100 million dollars. Though the sample is random from the population, which firms are excluded from the regression equation that is estimated in (a)? (5 Points)

f.) Suppose I take another sample from the same population, and estimate that $\hat{\beta}_{capital} = 0.1$. Which estimate, (a) or (f), is correct and why? (5 Points)

2. (15 Points) Using a random sample of workers in California, I estimate the following equation:

$$Hours = \beta_0 + \beta_1(educ - 12) + \beta_2 exper + u$$

Hours is hours worked per week, *educ* is years of schooling, and *exper* is years of experience. Please note that 12 years of schooling indicates completing a high school education.

a.) Suppose you estimate that $\hat{\beta}_2 = 1$. Please interpret this estimate. (5 Points)

b.) Suppose that $\hat{\beta}_0 = 40$. Please interpret this estimate. (10 Points)

Please enjoy your weekend.