Homework 1 for 4371/7371 Spring 2012.

Due at 3:00pm on March 7th. No late homework will be accepted. Please turn in in class only in case I don't receive your homework. That is, do not put your homework in my mailbox or slip it into my office in case I don't get it. Please remember to write your name(s) legibly and to write the course number on the top of the first page.

Wooldridge:
Problem 2.3
Problem 2.4 (i) (ii)(iii)
Problem 2.7
Problem 2.9 (i) (ii) Hint: use the formula in Equation (2.17) and Equation (2.19).
Problem 2.10

In the following regression, we assume that Assumptions SLR1-6 hold.

1. As in Example 2.4 of the textbook, I have the following regression results. *wage* denotes dollars per hours and *educ* denotes years of schooling.

$$\begin{array}{rcll} \widehat{wage} & = & -0.90 & +0.54edu \\ & & (0.685) & (0.053) \end{array} \tag{1}$$

with n=526, SST=7160 and SSR=5980.

(a) Interpret the coefficient 0.54.

(b) Define edu_{mo} as a new variable that denotes the months of schooling. It is true that $edu_{mo} = 12 * edu$. If I regress *wage* on edu_{mo}, what will be the new coefficient on edu_{mo} and what would be the new estimated standard deviation for $\hat{\beta}_{edu_{mo}}$? Interpret $\hat{\beta}_{edu_{mo}}$.

(c) Calculate the unbiased estimator for $Var(u|edu)$ where u denotes the error term in $wage = \beta_0 + \beta_1 edu + u$.

(d) Test if the education has positive impact on hourly wage at 5% significance level using the results from (1).

(e) Will the conclusion in (d) change if you use the regression result from (b)?

(f) What will be the predicted average hourly wage of a worker with 10 years of educations? What will be the predicted average hourly wage of a worker with 12 years of educations? What is the difference of the predicted average hourly wages between a worker with 10 years of eduction and the other with 12 years of eduction? What will be the difference between the predicted hourly wage between a work with 2 more years eduction than the other?

(g) Calculate the R^2 for this regression.

2. As in Example 2.10 of the textbook, I have the following regression results. *wage* denotes dollars per hours and *educ* denotes years of schooling.

$$\begin{array}{rcll} \widehat{\log(wage)} & = & 0.584 & +0.083edu \\ & & (0.097) & (0.007) \end{array} \tag{2}$$

with n=526, SST=148.3 and SSR=120.7.

(a) Interpret the coefficient 0.083.

(b) Define edu_{mo} as a new variable that denotes the months of schooling. It is true that $edu_{mo} = 12 * edu$. If I regress *wage* on edu_{mo}, what will be the new coefficient on edu_{mo} and what would be the new estimated standard deviation for $\hat{\beta}_{edu_{mo}}$? Interpret $\hat{\beta}_{edu_{mo}}$.

(c) Calculate the unbiased estimator for $Var(u|edu)$ where u denotes the error term in $\log(wage) = \beta_0 + \beta_1 edu + u$.

(d) Test if the education has an impact on hourly wage at 5% significance level using the results from (3). (This is against the two-sided alternative.)

(e) Calculate the R^2 for this regression.

3. As in Example 2.11 of the textbook, I have the following regression results. *salary* denotes annual salary in thousands of dollars and *sales* denotes firm annual sales in millions of dollars.

$$\begin{array}{rcll} \widehat{\log(salary)} & = & 4.821 & +0.256\log(sales) \\ & & (0.288) & (0.035) \end{array} \tag{3}$$

with n=209, SST=66.7 and SSR=52.65.

(a) Interpret the coefficient 0.256.

(b) Calculate the unbiased estimator for $Var(u|edu)$ where u denotes the error term in $\log(salary) = \beta_0 + \beta_1 \log(sales) + u$.

(c) Test if $\beta_{\log(sales)} = 0.25$ against the two-sided alternative at 10% significance level using the results from (3).

(d) Without redoing the whole problem, what would you expect the test result if we test for the same null in (c) at 5% significance level.

(e) If you measure the sales in billions dollars instead of millions dollars, will you expect the coefficient on $\log(salary)$ change? You just need to give the intuition.