**Homework # 1**

**Economics 113 - Fall 2009**

Due Friday, November 20th, beginning of class!

Please report all regression output and commands.

**Problem 1**

Using WageData.TXT from the course website, please run the following regression.

\[
\log(wage) = \beta_0 + \beta_{Educ} Educ + \beta_{Exper} Exper + \beta_{IQ} IQ + \beta_{MEduc} MEduc + \beta_{FEduc} FEduc + u \quad (1)
\]

Here, \(wage\) is the monthly wage, \(Educ\) is years of education, \(Exper\) is years of experience, \(IQ\) is IQ, and \(MEduc\) is mother's education in years, and \(FEduc\) the father's education in years.

a. What is the \(R^2\) for this regression?

b. Does IQ significantly affect wages? That is, can you conclude that \(\beta_{IQ}\) is significantly different from zero? Test this hypothesis at the 95% level.

c. Please construct a 99% confidence interval for \(\beta_{Exper}\). Please interpret your results.

d. Suppose that I reject the hypothesis that \(\beta_{MEduc} = 0\) in favor of a two-sided alternative. What does this mean? What is the probability that I'm wrong? Interpret the result.

e. Suppose that I claim the effect of parental education on wages does not differ between mother and father. Derive an equation to test this hypothesis, and estimate the new equation using R. Am I correct?

f. For this next part, estimate the following equation:

\[
wage = \beta_0 + \beta_{Edu} Educ + \beta_{Exper} Exper + \beta_{IQ} IQ + u
\]

Please derive the equation you would use to generate a prediction (with standard error) for a person with 10 years of education, 5 years of experience, and an IQ of 140. Please use R to generate a 90% confidence interval for this prediction.

**Problem 2**

Using the WageData.TXT dataset from the website, we wish to compare a few different wage regressions. Please use a 5% significance level for all regressions, and conduct hypothesis tests where necessary. Suppose that we start with the following model, hereafter referred to as the basic model:

\[
\log(wage) = \beta_0 + \beta_{Edu} Educ + \beta_{Exper} Exper + u
\]

a. Is the basic model preferred to the following model? Why or why not?

\[
\log(wage) = \beta_0 + \beta_{Edu} Educ + \beta_{Exper} Exper + \beta_{sibs} sibs + \beta_{brthord} brthord + u
\]

b. Now compare the basic model with the following model:

\[
wage = \beta_0 + \beta_{Edu} Educ + \beta_{Exper} Exper + \beta_{sibs} sibs + \beta_{brthord} brthord + u
\]

Which is preferred? Why or why not?

c. Starting from the basic model, do the returns to education depend on your IQ? Choose a new specification, regress it, and test the hypothesis at the 95% level.

d. Starting from the basic model, I claim that there is a level of education, above which the returns to education fall. Choose a new specification, regress it, and test this hypothesis at the 95% level. If there is such a level of education, does it seem reasonable?