Homework #2
Economics 113
Introduction to Econometrics
Professor Spearot
Due Thursday, December 1st, Beginning of Class

Problem 1

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

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

Here, \( wage \) is the monthly wage, \( Educ \) is years of education, \( Exper \) is years of experience, \( Tenure \) is years of tenure, and \( IQ \) is IQ.

a. Suppose that I claim the effect of experience is the exact same as tenure. Derive an equation to test this hypothesis, and estimate the new equation using R. Am I correct? Test any hypotheses you need at the 95% level.

b. Please estimate the following equation:

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

Is the model in (b) preferred to the model at the beginning of the question? If a hypothesis test is warranted, please state a null and alternative hypothesis, and test the null against the alternative at the 95% level. If not, provide other information to defend your answer.

c. Now, please estimate the following:

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

where \( Sibs \) is the number of siblings of the respondent. Is the model in (c) preferred to the model in (b)? If a hypothesis test is warranted, please state a null and alternative hypothesis, and test the null against the alternative at the 95% level. If not, provide other information to defend your answer.
Problem 2

Using the wage dataset from the website, please estimate the effect of categorical factors on wages using the following specification:

\[
\text{wage} = \beta_0 + \beta_{\text{Urban}}\text{Urban} + \beta_{\text{South}}\text{South} + \beta_{\text{UrbanSouth}}\text{Urban} \cdot \text{South} + u
\] (1)

where \( \text{Urban} \) equals 1 if the respondent lives in an Metropolitan Statistical Area and 0 otherwise, and \( \text{South} = 1 \) if the respondent lives in the South and 0 otherwise.

a. Please construct and interpret a 90\% confidence interval for \( \beta_{\text{Urban}} \).

b. Please interpret the coefficient \( \beta_{\text{UrbanSouth}} \). Using a two-sided t-test and a 95\% confidence level, please test whether this coefficient is significantly different from zero.