(ii) Is exper^2 statistically significant at the 1% level?

(iii) Using the approximation

\[ \% \Delta \text{wage} = 100(\hat{\beta}_2 + 2\hat{\beta}_3 \cdot \text{exper}) \Delta \text{exper}, \]

find the approximate return to the fifth year of experience. What is the approximate return to the twentieth year of experience?

(iv) At what value of exper does additional experience actually lower predicted log(wage)? How many people have more experience in this sample?

6.3 Consider a model where the return to education depends upon the amount of work experience (and vice versa):

\[ \log(\text{wage}) = \beta_0 + \beta_1 \cdot \text{educ} + \beta_2 \cdot \text{exper} + \beta_3 \cdot \text{educ} \cdot \text{exper} + \epsilon. \]

(i) Show that the return to another year of education (in decimal form), holding exper fixed, is \( \beta_3 \).

(ii) State the null hypothesis that the return to education does not depend on the level of exper. What do you think is the appropriate alternative?

(iii) Use the data in WAGE2.RAW to test the null hypothesis in (ii) against your stated alternative.

(iv) Let \( \theta_i \) denote the return to education (in decimal form), when exper = 10:

\[ \theta_i = \beta_1 + 10\beta_3. \]

Obtain \( \theta_i \) and a 95% confidence interval for \( \theta_i \). (Hint: Write \( \theta_i = \theta_0 - 10\beta_3 \) and plug this into the equation; then rearrange. This gives the regression for obtaining the confidence interval for \( \theta_i \).)

6.4 Use the data in GPA2.RAW for this exercise.

(i) Estimate the model

\[ \text{sat} = \beta_0 + \beta_1 \cdot \text{hsize} + \beta_2 \cdot \text{hsize}^2 + \epsilon, \]

where hsize is the size of the graduating class (in hundreds), and write the results in the usual form. Is the quadratic term statistically significant?

(ii) Using the estimated equation from part (i), what is the "optimal" high school size? Justify your answer.

(iii) Is this analysis representative of the academic performance of all high school seniors? Explain.

(iv) Find the estimated optimal high school size, using \( \log(\text{sat}) \) as the dependent variable. Is it much different from what you obtained in part (ii)?

6.5 Use the housing price data in HPRICE1.RAW for this exercise.

(i) Estimate the model

\[ \log(\text{price}) = \beta_0 + \beta_1 \log(\text{lotsize}) + \beta_2 \log(\text{sqrft}) + \beta_3 \cdot \text{bdrms} + \epsilon \]

and report the results in the usual OLS format.

Note: "sat" is a student's SAT standardized test score. Students take the SAT to get into college.