Temple University

Department of Economics

Econ 3503 – Introduction to Econometrics

Chapter 2 Exercises – Simple Regression

2.1 Consider the following observations on a demand line:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Y  Pounds | X  Dollars |  |  |  |  |  |  |  |
| 17 | 2 |  |  |  |  |  |  |  |
| 15 | 4 |  |  |  |  |  |  |  |
| 14 | 6 |  |  |  |  |  |  |  |
| 13 | 8 |  |  |  |  |  |  |  |
| 11 | 10 |  |  |  |  |  |  |  |
| 8 | 12 |  |  |  |  |  |  |  |
| 6 | 14 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

(a) Estimate *b1*, the intercept, and *b2*, the slope, by hand; i.e., with a pencil and paper rather than with your calculator.

(b) On a graph, plot the fitted regression line, using the fitted intercept and slope from the previous step.

(c) Locate (plot) the point of means  on the graph. Use the estimated regression to check that the fitted line passes through this point.

(d) Give the economic interpretation of *b2* .

(e) Construct the set of ,the least squares residuals, and write them in one of the columns in the above table.

(f) Find , an estimate of the error variance.

1. Compute . This is the standard error of the slope estimator.

2.2 An ice-cream parlor follows the following estimated relationship between ice cream sales and temperature: , where *y*=ice cream in pounds and *x*=degrees Fahrenheit.

(a) Below what temperature will no ice cream be sold on average?

(b) Sketch a graph of the estimated regression line.

(c) If the temperature is 75 degrees, how much ice cream will be sold on average?

2.3 This problem is based on a simple regression with 51 observations for the U.S. states and the District of Columbia. The dependent variable, *y*, is the state’s mean income (in $1000s) for males 18 years or older, and the independent variable, *x*, is the percentage of males in this age category who are high school graduates (PMHS).

(a) The estimate of the error variance equals 3.941. What is the sum of the squared residuals (residual sum of squares)?

(b) The estimated variance of *b2* is 0.0086. What are the standard error of *b2* and the value of ?

(c) What is the economic meaning of ?

(d) Given the means , find the estimate of the intercept.

(e) Given a particular state’s values of , compute the least squares residual,  for that state.

(f) Predict the state’s mean income with PMHS of 81.

2.4 Explain why each of the following statements is true or false:

(a) Although the sum of all least squares residuals equals zero, each individual residual does not.

(b) Since least squares estimators are the best, the sum of squared residuals can be made equal to zero.

(c) If, from an estimated regression line, the dependent variable *y* is a constant, the line is vertical.

(d) If the means of *x* and *y* are zero, the estimated *y*-intercept is zero, too.