

It is tempting and easy to get drawn into the tiny details of regression. This post and attached file is intended to help you maintain a big picture approach to the subject.

The key to answering questions like the ones for chapter 11 lies in the coefficients. The coefficients are the values that are used in the prediction formulae. The coefficients are used as CONSTANTS.

Note the formula on page 587 of the text -

$$Y = a + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

Y is the predicted value

a = the coefficient called "constant" in the table. There is only 1 constant. It is used for the value of "a" in the formula.

b₁ is the coefficient for the first independent variable

x₁ would be a what if value for x such as, what if the appraised value was \$135000 (\$135.2K).

b₂ and x₂ refer to the coefficient and what if value for the second independent variable.

The way we would "say" this equation is:

Y equals the coefficient "a" plus (the coefficient for "value" times the target value (ie 135.2)). The short version is Y equals the coefficient "a" plus the quantity x₁ times b₁.

DETAILS

The reason this assignment is somewhat confusing is because Y (price) is recorded in K dollars. Each of the X values, regardless of the units in which they are recorded, are used to produce the Y value which is in K dollars.

In short, because the model is set up to calculate a result in K dollars, each coefficient represents its impact in thousands of dollars. We must multiply the individual variable coefficients by 1000 if we want to see their impact in actual dollars instead of K dollars.

This is the basic formula for 1 independent variable:

$$Y = a + b_1x_1 \text{ where:}$$

"a" is the first constant listed in the regression output.

b₁ would be the value of the coefficient for "value"

x₁ would be the actual value for value (eg: 135.2)

In the assignment, the coefficient for value is .948 and the constant is 7.708

Therefore, to calculate the asking price in K dollars for a house valued at \$135.2K the formula is:

$$Y = 7.708 + (.948 * 135.2)$$

If you want to convert this to actual an actual accounting dollar amount, you must multiply the result by 1000.

The following formulae each produce the same results.

$$\begin{aligned} Y*1000 &= (Y=7.708 + (.948*135.2))*1000 \\ Y*1000 &= (7.708*1000) + (.948*135.2)*1000 \end{aligned}$$

USING THE FORMULA

$$Y = a + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

The coefficients are used as constants. note the formula on page 587 of the text -

Y is the predicted value. In the real estate problem Y refers to predicted price.

a = the coefficient called "constant" in the table There is only 1 constant. It is used for the value of "a" in the formula.

b₁ is the coefficient for the first independent variable x₁ would be a what if value for x such as, what if the appraised value was \$135000 (\$135.2K).

b₂ and x₂ refer to the coefficient and what if value for the second independent variable.

I recommend NOT CONVERTING anything into actual dollars until after using the formula to compute K dollars. That is the way the data is recorded and what the formula will produce.

Test references:

The simple regression formula and using it are discussed on pages 577 - 579 of the text.

The example on page 579 uses the data in figure 11.15 (page 579) to show how to set up and use the formula.

The general multiple regression formula is discussed on page 587. Using it is basically the same as the simple regression except that you have multiple (additional) coefficients and values for each of the additional IVs.

MORE DETAILS

The general formula is $Y = a + b_1x_1 + b_2x_2 + \dots + b_nx_n$

The formula works for "n" independent variables.

If there were only 1 variable (say "value"), the formula would look like this $Y = a + b_1x_1$

"a" is the first constant listed in the regression output.

b₁ would be the value of the coefficient for "value"

x₁ would be the actual value for value (eg: 135.2)

The calculated value of Y will equal the predicted "price".

Look at the following excerpt from the regression output for “value”.

Regression Table		Coefficient
Constant		7.708
Value		0.948

Formula to predict asking price: $Y = a + b_1x_1$

Y is the predicted price.

“a” is the model constant for the value model. It is 7.708

B1 is the coefficient for value. It is 0.948

X1 is the given appraised value for which you want to calculate an asking price. In the homework assignment it is 135.2

Do NOT expect all the values in the data base to line up with a predicted value. Remember, when we force a line through points in a scatter plot, not all the points will fall on the line.

The final formula would be $Y=7.708 + (.948*135.2)$