Extra Chapter 10

Simple Linear Regression Analysis

1. True or False

   a) _____ The dependent variable is the variable that is being described, predicted, or controlled.

   b) _____ A simple linear regression model is an equation that describes the straight-line relationship between a dependent variable and an independent variable.

   c) _____ In simple regression analysis, r^2 is a percentage measure and measures the proportion of the variation explained by the simple linear regression model.

   d) _____ If $r = -1$, then we can conclude that there is a perfect negative relationship between X and Y.

2. The simple linear regression (least squares method) minimizes:

   A. The explained variation

   B. SS_{yy}

   C. Total variation

   D. SS_{xx}

   E. SSE

3. The correlation coefficient may assume any value between

   A. 0 and 1

   B. 0 and 8

   C. -1 and 1

   D. -1 and 0

4. The data regarding the production of wheat in tons (X) and the price of the kilo of flour in pesetas (Y) in the decade of the 80's in Spain were:

Wheat production	25	25	26	28	31	33
Flour price (per kilo)	40	42	40	30	25	27

Some pre-computed values are:

$$\bar{x} = 28, \quad \bar{y} = 34,$$

$$SS_{xy} = \sum_{i=1}^{6} (x_i - \bar{x})(y_i - \bar{y}) = -116$$

$$SS_{xx} = \sum_{i=1}^{6} (x_i - \bar{x})^2 = 56$$

$$SS_{yy} = \sum_{i=1}^{6} (y_i - \bar{y})^2 = 282.$$

a) Fit the regression line using the method of least squares.

b) Use the least squares regression equation to estimate the flour price per kilo when the production of wheat is 40 tons.

c) If, in fact, the price per kilo of the production at 40 tons is 23 pesetas, Calculate the value of the error for this observation.

d) Test the significance of the slope β_1 by completing ANOVA table.

e) Calculate the coefficient of determination and the sample correlation coefficient.