Example 1 Heights of Mothers, Fathers, and Daughters

Table 10-4 includes a random sample of heights of mothers, fathers, and their daughters (based on data from the National Health and Nutrition Examination). Find the multiple regression equation in which the response (y) variable is the height of a daughter and the predictor (x) variables are the height of the mother and height of the father.

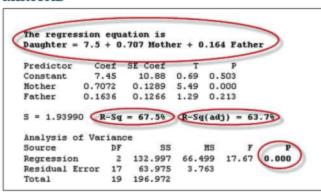
Solution

Using Minitab with the sample data in Table 10-4, we obtain the results shown in the display.

Table 10-4 Heights (in inches) of Mothers, Fathers, and Their Daughters

and Their Daughters		
Height of Mother	Height of Father	Height of Daughter
63	64	58.6
67	65	64.7
64	67	65.3
60	72	61.0
65	72	65.4
67	72	67.4
59	67	60.9
60	71	63.1
58	66	60.0
72	75	71.1
63	69	62.2
67	70	67.2
62	69	63.4
69	62	68.4
63	66	62.2
64	76	64.7
63	69	59.6
64	68	61.0
60	66	64.0
65	68	65.4

MINITAB



From the display, we see that the multiple regression equation is

Daughter =
$$7.5 + 0.707$$
 Mother + 0.164 Father

Using our notation presented earlier in this section, we could write this equation as

$$\hat{y} = 7.5 + 0.707x_1 + 0.164x_2$$

where \hat{y} is the predicted height of a daughter, x_1 is the height of the mother, and x_2 is the height of the father.