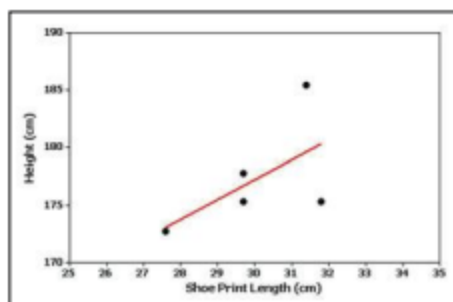


(a) Bad Model (*continued*)

The regression line does *not* fit the points well, as shown here.



$r = 0.591$, which suggests that there is *not* a linear correlation between shoe print length and height. (The P -value is 0.294.)

The given shoe print length of 29 cm is not beyond the scope of the available data.



Because the regression equation $\hat{y} = 125 + 1.73x$ is *not* a good model, the best predicted height is simply the mean of the sample heights: $\bar{y} = 177.3$ cm (or 69.8 in.).

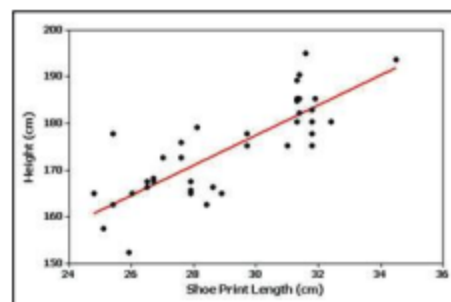
Interpretation

Key point: Use the regression equation for predictions only if it is a good model. If the regression equation is not a good model, use the predicted value of \bar{y} .

(b) Good Model (*continued*)

The regression line *does* fit the points well, as shown here. The equation of this regression line can be easily found from technology to be this:

$$\hat{y} = 80.9 + 3.22x$$



$r = 0.813$, which suggests that there *is* a linear correlation between shoe print length and height. (The P -value is 0.000.)

The given shoe print length of 29 cm is not beyond the scope of the available data.



Because the regression equation $\hat{y} = 80.9 + 3.22x$ *is* a good model, substitute $x = 29$ cm into this regression equation to get a predicted height of 174.3 cm (or 68.6 in.).

Part 2: Beyond the Basics of Regression

In Part 2 we consider the concept of marginal change, which is helpful in interpreting a regression equation; then we consider the effects of outliers and special points called *influential points*. We also consider residual plots.

Interpreting the Regression Equation: Marginal Change

We can use the regression equation to see the effect on one variable when the other variable changes by some specific amount.

DEFINITION In working with two variables related by a regression equation, the **marginal change** in a variable is the amount that it changes when the other variable changes by exactly one unit. The slope b_1 in the regression equation represents the marginal change in y that occurs when x changes by one unit.