Exercise 25

Anthropologists use a linear model that relates human femur (thighbone) length to height. The model allows an anthropologist to determine the height of an individual when only a partial skeleton (including the femur) is found. Here we find the model by analyzing the data on femur length and height for the eight males given in the following table.

(a) Make a scatter plot of the data.

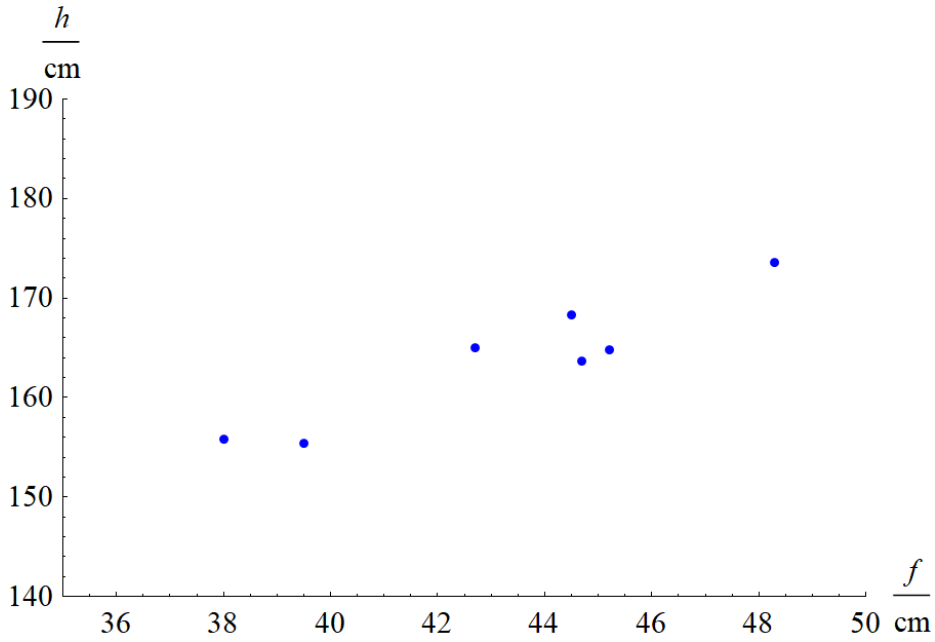
(b) Find and graph the regression line that models the data.

(c) An anthropologist finds a human femur of length 53 cm. How tall was the person?

Femur length (cm)	Height (cm)	Femur length (cm)	Height (cm)
50.1	178.5	44.5	168.3
48.3	173.6	42.7	165.0
45.2	164.8	39.5	155.4
44.7	163.7	38.0	155.8

Solution

A scatter plot of the provided data is shown below.

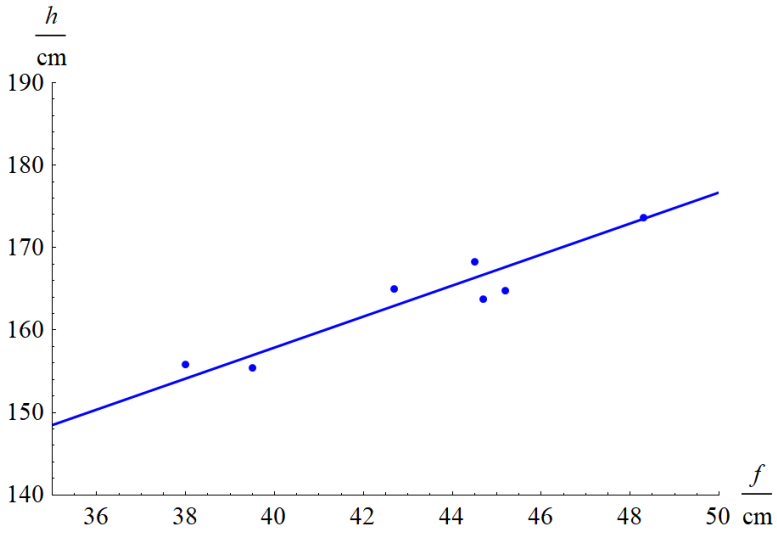


A linear model is appropriate here because the points appear to be on or near a line. Using Mathematica's Fit function gives

$$y \approx 82.6497 + 1.88074x$$

for the least squares regression line.

It's shown below with the plotted data.



Use the regression line to estimate a person's height with a femur length of 53 cm.

$$y(53) \approx 82.6497 + 1.88074(53) \approx 182 \text{ cm}$$