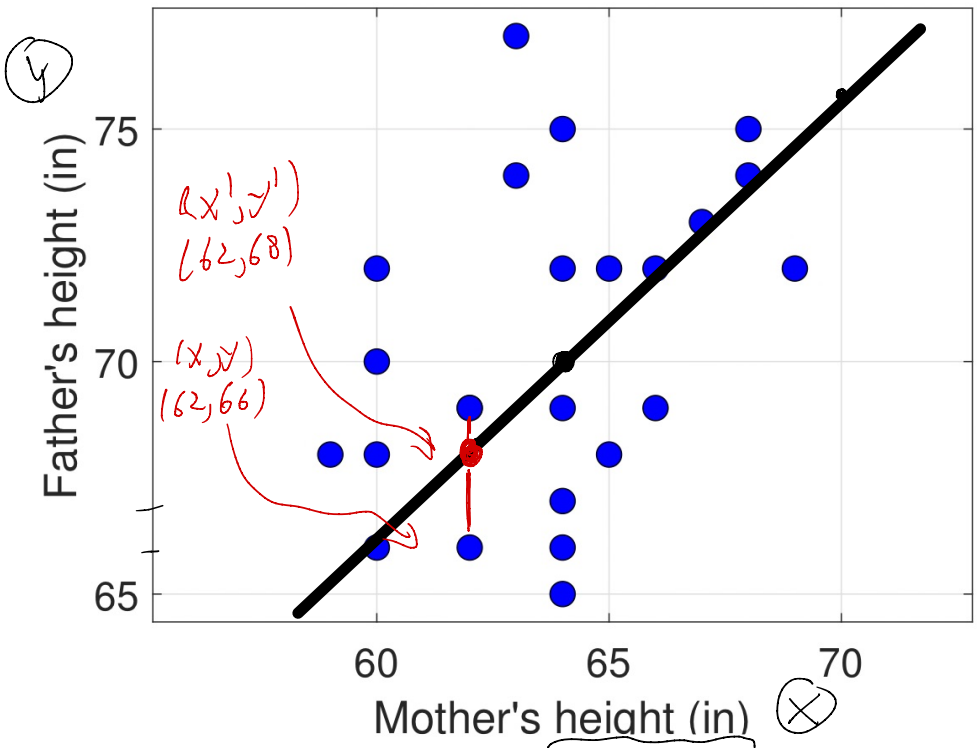

Pearson correlation $r = 0.41$

Let's pick a good fitting line.

need a point that the line goes through: $x = 64$, $y = 70$

need a slope. $m = 1$ so if $x = 70$, $y =$

How well does this line fit?

Equation of line: given a point (x_c, y_c), slope m

$$y' - y_c = m(x' - x_c)$$

$$y' - 70 = 1(x' - 64)$$

$$y' = x' + 6$$

If $x = 62$, $y' = 62 + 6 = 68$ inches

plot $(x', y') = (62, 68$

$$S_{yx} = \sqrt{\frac{\Sigma (y - y')^2}{n}}$$

n = # of points (24)

"standard error of the estimate"

for this line; $S_{yx} = 3.35$ inches

Can we find a better line?

The best line, called the regression line, goes through... $(\bar{x}, \bar{y})$

$\bar{x} = 63.71$, $\bar{y} = 70.33$, $S_x = 2.77$, $S_y = 3.33$

and has a slope:

$$m = r \cdot \frac{S_y}{S_x} = (0.41)\frac{3.33}{2.77} = 0.49$$

line:

$$y' - \bar{y} = r \cdot \frac{S_y}{S_x}(x - \bar{x})$$

$$y' - 70.33 = 0.49(x - 63.71)$$

$$y' = 0.49x + 70.33 - (0.49)(63.71) = \boxed{0.49x + 39.11}$$

0.49: slope; $70.33 - (0.49)(63.71)$: y-intercept

For example, if a mother is 64.5 inches tall, how tall do we expect the father to be?

$$y' = (0.49)(64.5) + 39.11 = 70.71 \text{ inches}$$

How well does the line fit the data?

$$S_{yx} = \Sigma \frac{(y' - y)^2}{n} = \underline{2.98 \text{ inches}}$$

Suppose IQ's for twins correlate with $r = 0.8$

what is the regression line that predicts one sibling's IQ from the other?

IQ's mean 100, s.d. 15

$\bar{x} = 100 \quad s_x = 15 \quad r = 0.8$

$\bar{y} = 100 \quad s_y = 15$

slope: $r \cdot \frac{s_y}{s_x} = 0.8 \cdot \frac{15}{15} = 0.8$

$$y' - \bar{y} = r \cdot \frac{s_y}{s_x}(x - \bar{x})$$

$$= y' - 100 = 0.8(x - 100)$$

$$y' = 0.8x - 80 + 100 = \underline{0.8x + 20}$$

If one sibling has an IQ of 115, what do we expect the other's IQ to be?

$$y' = (0.8)(115) + 20 = \boxed{112}$$

if $x = \underline{70}$, $y' = 0.8 \cdot 70 + 20 = \underline{76}$