

# Example: Very Simple Linear Regression

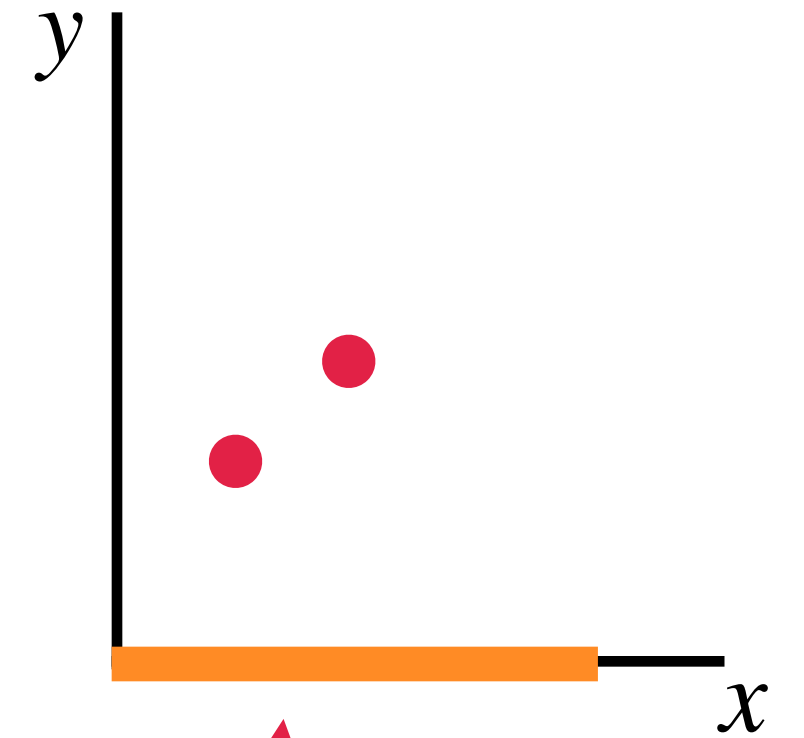
Gradient:

$$\begin{bmatrix} \frac{\partial RSS}{\partial b_0} \\ \frac{\partial RSS}{\partial b_1} \end{bmatrix} = \begin{bmatrix} -2 \sum_i^N (y_i - (b_0 + b_1 x_i)) \\ -2 \sum_i^N x_i (y_i - (b_0 + b_1 x_i)) \end{bmatrix}$$

Initialize the gradient algorithm at **(0,0)**

$$\Rightarrow \begin{bmatrix} -2 \sum_i^N (y_i - (0 + 0x_i)) \\ -2 \sum_i^N x_i (y_i - (0 + 0x_i)) \end{bmatrix} = \begin{bmatrix} -2 \sum_i^N (y_i) \\ -2 \sum_i^N x_i (y_i) \end{bmatrix}$$

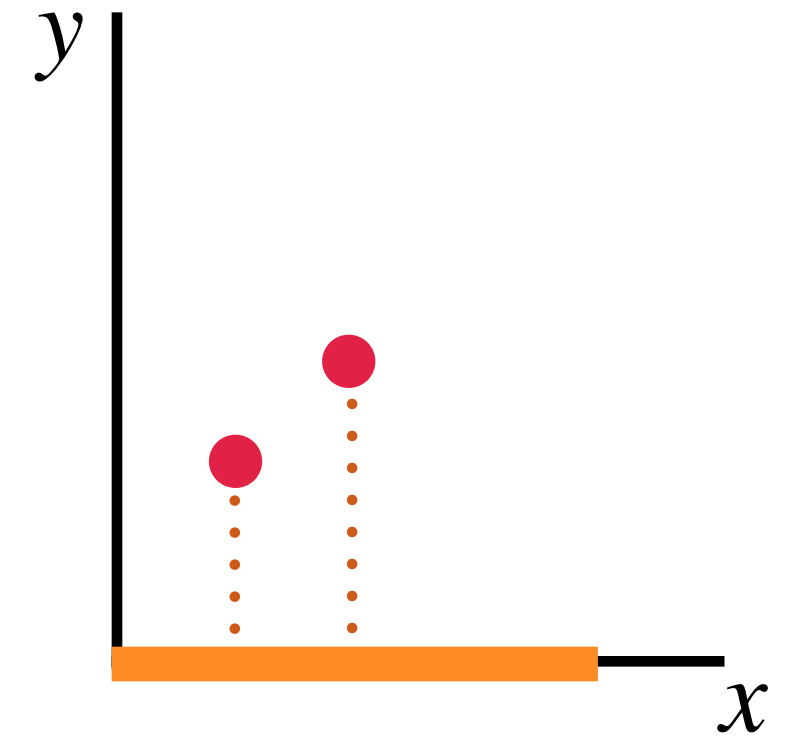
plug in our actual values



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Gradient:

$$\begin{bmatrix} \frac{\partial RSS}{\partial b_0} \\ \frac{\partial RSS}{\partial b_1} \end{bmatrix} = \begin{bmatrix} -2 \sum_i^N (y_i - (b_0 + b_1 x_i)) \\ -2 \sum_i^N x_i (y_i - (b_0 + b_1 x_i)) \end{bmatrix}$$



Initialize the gradient algorithm at (0,0)

$$\Rightarrow \begin{bmatrix} -2 \sum_i^N (y_i) \\ -2 \sum_i^N x_i (y_i) \end{bmatrix} = \begin{bmatrix} -2(2 + 3) \\ -2(1 \cdot 2 + 2 \cdot 3) \end{bmatrix} = \begin{bmatrix} -10 \\ -16 \end{bmatrix}$$

These are the changes we need to make to intercept and slope in order to reduce our loss function.