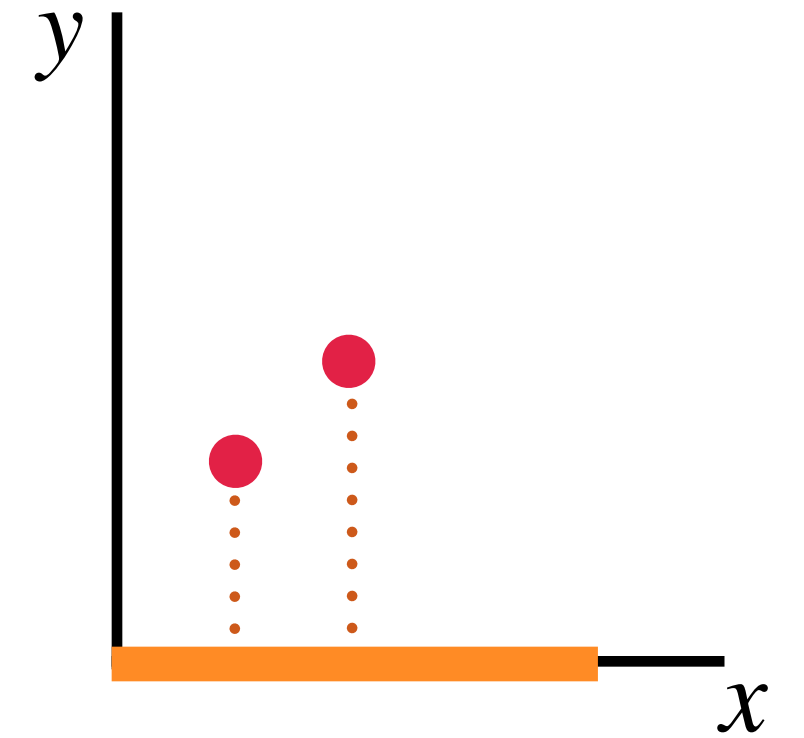# Example: Very Simple Linear Regression

Gradient:

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

Initialize the gradient algorithm at (0,0)

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

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

Example: Very Simple Linear Regression

Gradient:

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Initialize the gradient algorithm at (0,0)

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

Compute loss function value:

$$RSS = \sum_i^N (y_i - b_0 - b_1 x_i)^2 = (2 - 0 - 0\cdot 1)^2 + (3 - 0 - 0\cdot 3)^2 = 13$$