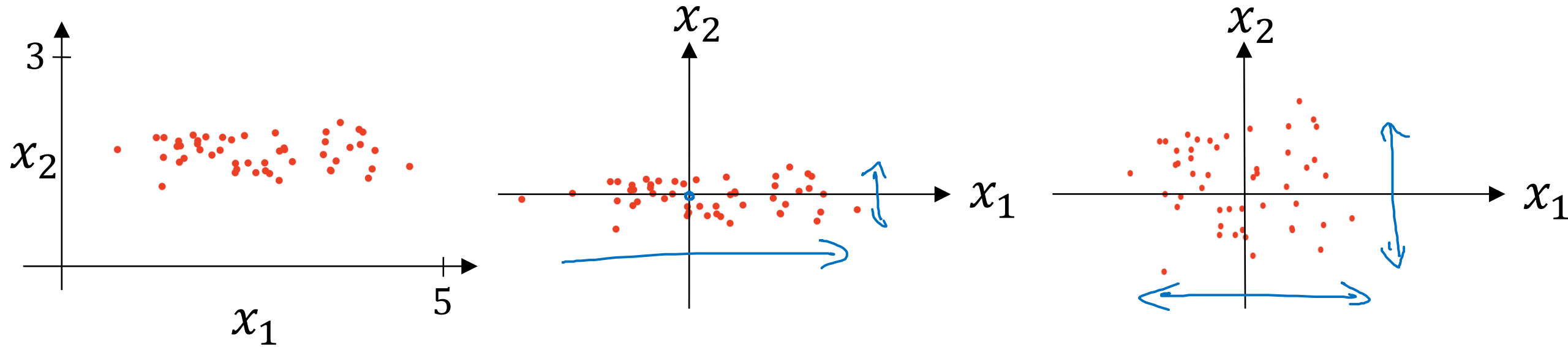# Setting up your optimization problem

Normalizing inputs

deeplearning.ai

Normalizing training sets

$$x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

Substract mean:

$$\mu = \frac{1}{m} \sum_{i=1}^{m} x^{(i)}$$

$$x := x - \mu$$

Normalize variance

$$\sigma^2 = \frac{1}{m} \sum_{i=1}^{m} x^{(i)} **2$$
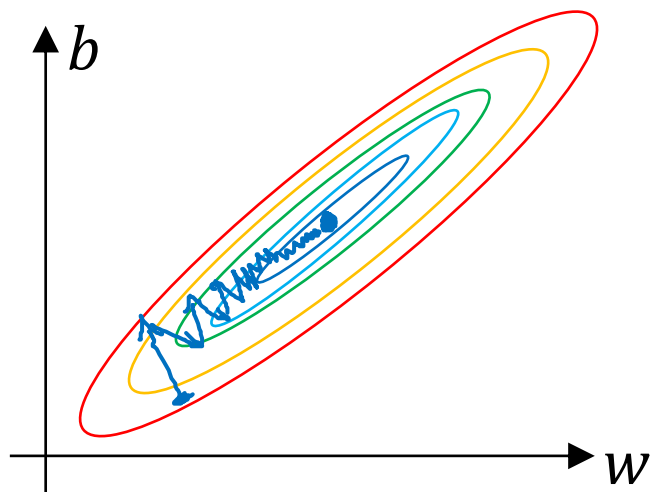
↖ element-wise
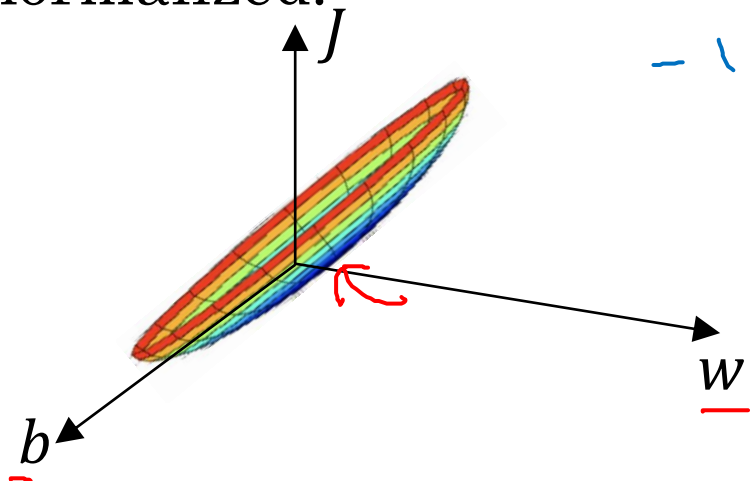
$$x /= \sigma^2$$

Use same μ, σ^2 to normalize test set.

Why normalize inputs?

$$J(w, b) = \frac{1}{m} \sum_{i=1}^{m} \mathcal{L}\left(\hat{y}^{(i)}, y^{(i)}\right)$$

$w_1 \quad x_1: \quad \underline{1 \cdots 1000} \leftarrow$

$w_2 \quad x_2: \quad \underline{0 \cdots 1} \leftarrow$

$-1 \cdots 1$

Unnormalized:

Normalized:

$x_1: 0 \cdots 1$

$x_2: -1 \cdots 1$

$x_3: 1 \cdots 2$