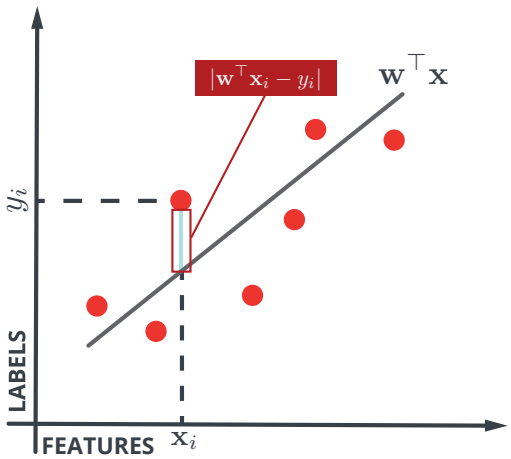
eCornell

CHEAT SHEET

Linear Regression

Algorithm Name	Linear Regression
Description	Linear regression predicts a label of a given data point using a predicted "line" defined by $\mathbf{w}$. The task is to learn this $\mathbf{w}$ by minimizing its loss function or solving for a closed-form solution.
Applicability	Regression problems.
Assumptions	$y_i \vert \mathbf{x}_i \sim N(\mathbf{w}^\top \mathbf{x}_i, \sigma^2)$ 
Underlying Mathematical Principles	The loss function being minimized: $l(\mathbf{w}) = \frac{1}{n}\sum_{i=1}^{n}(\mathbf{x}_i^\top \mathbf{w} - y_i)^2$ In essence, you try to minimize the prediction's deviation from the actual output.
Additional Details	We can find the optimal solution by: 1. Using the closed form formula $\mathbf{w} = (\mathbf{X}^T\mathbf{X})^{-1}\mathbf{X}^T\mathbf{y}$. 2. Using gradient descent.
Example	Predict house prices as a function of square footage and build date.