# Useful Formulas

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## Least Square Method

For Simple Linear Regression:

$$y = \theta_0 + \theta_1 x$$

$$\theta_1 = \frac{\sum_{i=1}^{m}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{m}(x_i - \bar{x})^2}$$

$$\theta_0 = \bar{y} - \theta_1 \bar{x}$$

# Useful Formulas

## Gradient Descent (Iterative)

For Simple Linear Regression:

$$y = \theta_0 + \theta_1 x$$

$$\theta_0 = \theta_0 - \alpha \cdot \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x_i) - y_i)$$

$$\theta_1 = \theta_1 - \alpha \cdot \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x_i) - y_i) x_i$$

# Useful Formulas

## Least Square Method

For Multivariate Linear Regression:

$$y = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \cdots + \theta_n x_n$$

$$\theta_j = \frac{\sum_{i=1}^{m} (x_j^{(i)} - \bar{x_j})(y^{(i)} - \bar{y})}{\sum_{i=1}^{m} (x_j^{(i)} - \bar{x_j})^2}, \quad \text{for } j = 1, 2, ..., n$$

$$\theta_0 = \bar{y} - \theta_1 \bar{x_1} - \theta_2 \bar{x_2} - ... - \theta_n \bar{x_n}$$

or:

$$\theta_0 = \bar{y} - \sum_{j=1}^{n} \theta_j \bar{x_j}$$

# Useful Formulas

## Gradient Descent (Iterative)

For Multivariate Linear Regression:

$$y = \theta_0 + \theta_1 x_1 + \theta_2 x_2 + \cdots + \theta_n x_n$$

$$\theta_0 = \theta_0 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)})$$

$$\theta_j = \theta_j - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)}) x_j^{(i)}, \quad \text{for } j = 1, 2, ..., n$$