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## **Gradient Descent For Multiple Variables**

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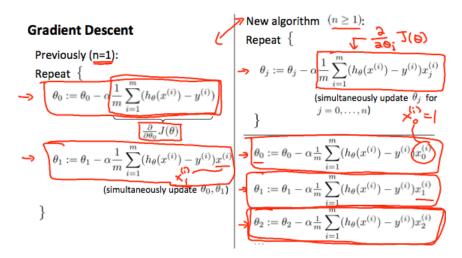
The gradient descent equation itself is generally the same form; we just have to repeat it for our 'n' features:

repeat until convergence: { 
$$\theta_0 := \theta_0 - \alpha \frac{1}{m} \sum_{i=1}^m \left( h_\theta(x^{(i)}) - y^{(i)} \right) \cdot x_0^{(i)}$$
 
$$\theta_1 := \theta_1 - \alpha \frac{1}{m} \sum_{i=1}^m \left( h_\theta(x^{(i)}) - y^{(i)} \right) \cdot x_1^{(i)}$$
 
$$\theta_2 := \theta_2 - \alpha \frac{1}{m} \sum_{i=1}^m \left( h_\theta(x^{(i)}) - y^{(i)} \right) \cdot x_2^{(i)}$$
 ... }

In other words:

repeat until convergence: { 
$$\theta_j:=\theta_j-\alpha\frac{1}{m}\sum_{i=1}^m(h_\theta(x^{(i)})-y^{(i)})\cdot x_j^{(i)}\qquad\text{for }j:=0...n$$
 }

The following image compares gradient descent with one variable to gradient descent with multiple variables:



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