

## Partial differentiation with theta 1 (slope)

$$\begin{aligned}\frac{\partial}{\partial \theta_1} J(\theta_0, \theta_1) &= \frac{\partial}{\partial \theta_1} \frac{1}{2m} \sum_{i=1}^m (h_{\Theta}(x^i) - y^i)^2 \\&= \frac{1}{m} \sum_{i=1}^m (h_{\Theta}(x^i) - y^i) \frac{\partial}{\partial \theta_1} (h_{\Theta}(x^i) - y^i) \\&= \frac{1}{m} \sum_{i=1}^m (h_{\Theta}(x^i) - y^i) \frac{\partial}{\partial \theta_1} (\theta_0 x_0 + \theta_1 x_1 - y^i) \\&= \frac{1}{m} \sum_{i=1}^m (h_{\Theta}(x^i) - y^i) x_1\end{aligned}$$