

$$Z = w_1 x_1 + w_2 x_2 + w_3 x_1^2 x_2 + w_4 x_1^2 x_2^2 + w_5 x_1^2 x_2^3 + \dots + b$$

$$f_{\vec{w}, b}(\vec{x}) = \frac{1}{1 + e^{-Z}}$$

This will overfit due to being a higher order polynomial.

To apply regularization, our cost function is similar to linear regression except definition of $f_{\vec{w}, b}(\vec{x})$

$$J(\vec{w}, b) = \frac{1}{2m} \sum_{i=1}^m (f_{\vec{w}, b}(\vec{x}^{(i)}) - y^{(i)})^2 + \frac{\lambda}{2m} \sum_{j=1}^n w_j^2$$

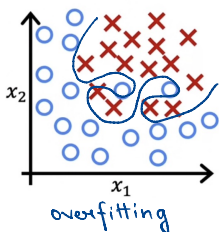
To minimize this, we use gradient descent:-

repeat {

$$w_j = w_j - \alpha \left[\frac{1}{m} \sum_{i=1}^m (f_{\vec{w}, b}(\vec{x}^{(i)}) - y^{(i)}) x_j^{(i)} + \frac{\lambda}{m} w_j \right]$$

don't have to
regularize →

$$b = b - \alpha \left[\frac{1}{m} \sum_{i=1}^m (f_{\vec{w}, b}(\vec{x}^{(i)}) - y^{(i)}) \right] \} \text{update simultaneously}$$



after regularization →

