

$$w^* =$$

$$a^{(i)} (y^{(i)} - w^T x^{(i)})^2 + \frac{1}{2} \lambda \|w\|^2$$

$$(y^{(i)} - w^T x^{(i)})^2 + \frac{1}{2} \lambda \|w\|^2$$

$$(y - Xw)^T (y - Xw) + \frac{1}{2} \lambda w^T w$$

$$y^T y + w^T X^T X w - 2w^T X^T y + \frac{1}{2} \lambda w^T w$$

$$\nabla L(w^*) = 2X^T X w^* - 2X^T y + \lambda w^*$$

$$= 2X^T X w^* + \lambda w^* - 2X^T y$$

$$2X^T X w^* + \lambda w^* = 2X^T y$$

$$X^T X w^* + \lambda w^* = X^T y$$

$$w^* (X^T X + \lambda I) = X^T y$$

$$w^* = (X^T X + \lambda I)^{-1} X^T y$$

Thus, wts:

$$a^{(i)} (y^{(i)} - w^T x^{(i)})^2 + \frac{1}{2} \lambda \|w\|^2$$

$$a^{(i)} (y^{(i)} - w^T x^{(i)})^2 + \frac{1}{2} \lambda w^T w \rightarrow w^* = (X^T A X + \lambda I)^{-1} X^T A y$$

$$A (y - Xw)^T (y - Xw) + \lambda w^T w$$

$$A (y^T y + w^T X^T X w - 2w^T X^T y) + \lambda w^T w$$

$$A y^T y + A w^T X^T X w - 2A w^T X^T y + \lambda w^T w$$

$$\nabla L(w^*) = 2X^T A X w^* - 2X^T A y + \lambda w^*$$

$$2X^T A X w^* + \lambda w^* - 2X^T A y = 0$$

$$2X^T A X w^* + \lambda w^* = 2X^T A y$$

$$X^T A X w^* + \lambda w^* = X^T A y$$

$$w^* (X^T A X + \lambda I) = X^T A y$$

$$w^* = \frac{X^T A y}{(X^T A X + \lambda I)} = (X^T A X + \lambda I)^{-1} X^T A y$$