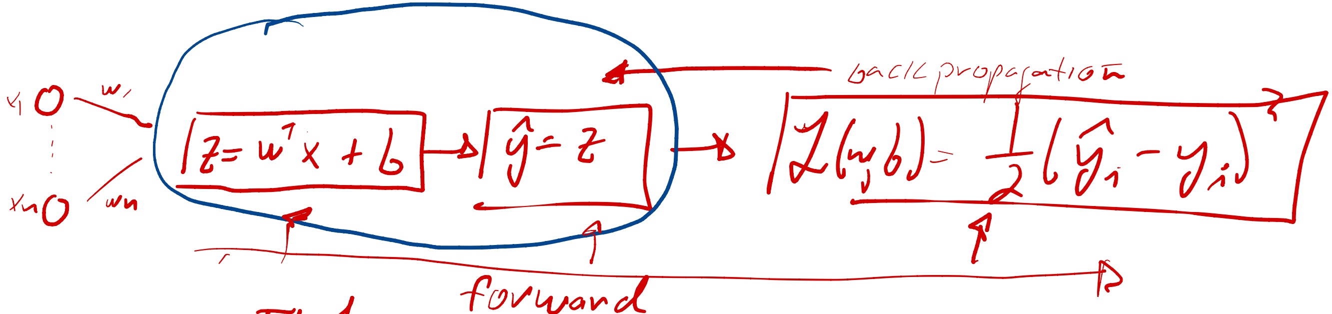

$$w = w + \alpha \nabla_w \mathcal{L}$$

$$\nabla_{\hat{y}} \mathcal{L} = \frac{d}{d\hat{y}}\left[\frac{1}{2}(\hat{y} - y)^2\right] = \frac{1}{\cancel{2}}\cancel{2} \cdot (\hat{y} - y)(1) = \boxed{\hat{y} - y}$$

$$\nabla_z \mathcal{L} = \frac{d\mathcal{L}}{d\hat{y}} \cdot \frac{d\hat{y}}{dz} = (\hat{y} - y)(1) = \boxed{\hat{y} - y}$$

$$\frac{d\hat{y}}{dz} = \frac{d}{dz}(z) = 1$$

$$\nabla_w \mathcal{L} = \frac{\partial \mathcal{L}}{\partial \hat{y}} \cdot \frac{\partial \hat{y}}{\partial z} \cdot \frac{\partial z}{\partial w} = (\hat{y} - y)(1)(x) = \boxed{(\hat{y} - y)x}$$

$$\frac{\partial z}{\partial w} = \frac{\partial [w^T x + b)}{\partial w} = x$$

$$\nabla_b \mathcal{L} = \frac{\partial \mathcal{L}}{\partial \hat{y}} \cdot \frac{\partial \hat{y}}{\partial z} \cdot \frac{\partial z}{\partial b} = (\hat{y} - y)(1)(1) = \boxed{\hat{y} - y}$$

$$\frac{\partial z}{\partial b} = \frac{\partial [w^T x + b]}{\partial b} = 1$$

$$\nabla J = \sum_{i=1}^{n} \mathcal{L}(\hat{y}_i, y_i)$$

$$\boxed{\nabla_w J} = \frac{1}{m}\sum_{i=1}^{n} (\hat{y}_i - y_i)\, x_i = \boxed{\frac{1}{m} X (\hat{y} - y)}$$

$$\boxed{\nabla_b J} = \frac{1}{m}\sum_{i=1}^{n} (\hat{y}_i - y_i) = \frac{1}{m} (\hat{y} - y)^T \mathbb{1}$$

$$= \boxed{\frac{1}{m}\, \mathrm{np.sum}(\hat{y} - y)}$$

Algoritmo (Reg Lineal con 1 neurona)

for $t = 1$ to max_iter:

$$z = w.T @ X + b$$

$$\hat{y} = z$$

$$dz = \hat{y} - y$$

$$dw = \frac{1}{m} X @ dz.T$$

$$db = \frac{1}{m} np.sum(dz)$$

$$w = w - lr * dw$$

$$b = b - lr * db$$

$$z = w^T x + b$$