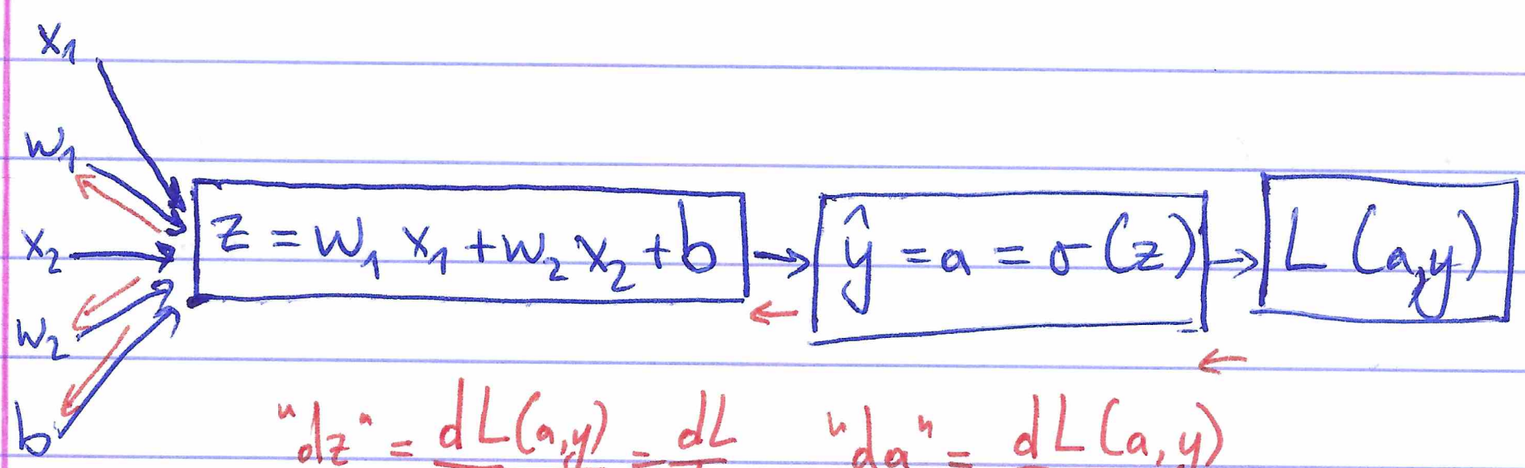
Log. Reg. GD

$$z = w^T x + b$$
$$\hat{y} = a = \sigma(z)$$
$$L(a,y) = -(y \log(a) + (1-y)\log(1-a))$$



$$\text{"}dz\text{"} = \frac{dL(a,y)}{dz} = \frac{dL}{dz} \qquad \text{"}da\text{"} = \frac{dL(a,y)}{da}$$

$$= a - y \qquad = -\frac{y}{a} + \frac{1-y}{1-a}$$

$$= \frac{dL}{da}\frac{da}{dz} \quad -a(1-a)$$

$$\text{"}dw_1\text{"} = \frac{dL}{dw_1} = x_1 dz, \quad \text{"}dw_2\text{"} = x_2 dz, \quad \text{"}db\text{"} = dz$$

Updates:

$w_1 := w_1 -$

$w_2 := w_2 -$

$b := b - \alpha$

Log reg. on m examples

$$J(w,b) = \frac{1}{m}\sum_{i=1}^{m} L(a^{(i)}, y^{(i)})$$

$$a^{(i)} = \hat{y}^{(i)} = \sigma(z^{(i)}) = \sigma(w^T x^{(i)} + b)$$

$dw_1^{(i)}, dw_2^{(i)}, db^{(i)}$

$$\frac{\partial}{\partial w_1} J(w,b) = \frac{1}{m}\sum_{i=1}^{m} \underbrace{\frac{\partial}{\partial w_1} L(a^{(i)}, y^{(i)})}_{dw_1^{(i)} - (x^{(i)}, y^{(i)})}$$