$$f(x_1, x_2) = (1 - x_1)^2 + 100(x_2 - x_1^2)$$

$$f(x_1, x_2) = (1 - x_1)(1 - x_1) + 100(x_2 - x_1^2)$$

$$f(x_1, x_2) = 1 - 2x_1 + x_1^2 + 100x_2 - 100x_1^2$$

$$f(x_1, x_2) = -99x_1^2 + 100x_2 - 2x_1 + 1$$

$$A = \begin{bmatrix} -99 & 0 \\ 0 & 0 \end{bmatrix}$$

$$f(x_1, x_2) = X^T \begin{bmatrix} -99 & 0 \\ 0 & 0 \end{bmatrix} x + X^T \begin{bmatrix} -2 \\ 100 \end{bmatrix} + 1$$

$$B = \begin{bmatrix} -2 \\ 100 \end{bmatrix}$$

$$C = 1$$

$$-L = \Sigma\, y \log(\hat{y}) + (1-y)\log(1-\hat{y})$$

$$a = \hat{y}$$

$$a = \sigma(z)$$

$$-L = \Sigma\, y \log(\sigma(z)) + (1-y)\log(\sigma_z))$$

$$\frac{d}{dx} = \log(x)\frac{d}{dx} = \frac{1}{x}$$

$$\frac{\partial L}{\partial w} = \left(\frac{y}{\sigma(z)} - \frac{1-y}{1-\sigma(z)}\right)\frac{\sigma(z)}{\partial w}$$

$$\sigma(x)$$

$$\frac{y}{\sigma(z)}\frac{(1-\sigma(z))}{(1-\sigma(z))} - \frac{(1-y)(\sigma(z))}{1-\sigma(z)\,(\sigma(z))}$$

$$-L = \frac{y - \cancel{y\sigma(z)} - \sigma(z) + \cancel{y\sigma(z)}}{\sigma(z)(1-\sigma(z))}\left(\frac{\partial\sigma(z)}{\partial w}\right.$$

$$L = \frac{\sigma(z) - y}{\sigma(z)(1-\sigma(z))}\left(\frac{\partial\sigma}{\partial w}\right)$$

$$\frac{\partial\sigma}{\partial w} = \sigma'(z) = \sigma(z)(1-\sigma(z))$$

$$\frac{\partial L}{\partial w} = \left(\frac{\sigma(z) - y}{\cancel{\sigma(z)(1-\sigma(z))}}\right)\cancel{\sigma(z)(1-\sigma(z)}$$

$$\frac{\partial L}{\partial w} = \sigma(z) - y$$