

## Problem 2 cont'd

Q.1  $y=0$

want  $\| \text{loss}(x, y, w) \| = \text{minimum} = 0$ , since norms are non-neg

occurs when  $\nabla_{\text{loss}}(x, y, w) = 0$

$$\sigma(z) = \frac{1}{1 + e^{-w \cdot \phi(x)}} = 0$$

or

$$1 - \sigma(z) = \frac{e^{-w \cdot \phi(x)}}{1 + e^{-w \cdot \phi(x)}} = \frac{1}{1 + e^{w \cdot \phi(x)}} = 0$$

or

$$\sigma(z) - y = \sigma(z) - 0 = \sigma(z) > 0 \quad (\text{already known})$$

or

$$\phi(x) = 0 \quad (\text{null case; unhelpful})$$

$$\text{so } \frac{1}{1 + e^{-w \cdot \phi(x)}} = 0 \Rightarrow 1 + 0^{-w \cdot \phi(x)} \rightarrow \infty$$

$$\frac{1}{e^{w \cdot \phi(x)}} \rightarrow \infty$$

$$w \cdot \phi(x) \rightarrow -\infty$$