

Prove that: $\sigma'(y) = \sigma(y)(1 - \sigma(y))$

$$\sigma(y) = \frac{1}{1 + e^{-y}}$$

$y = w \cdot x$, y is a function

$$\sigma'(y) =$$

$$\left(\frac{1}{1 + e^{-y}} \right)' =$$

$$\left((1 + e^{-y})^{-1} \right)' =$$

$$-1 \cdot (1 + e^{-y})^{-2} \cdot (1 + e^{-y})' =$$

$$-\frac{1}{(1 + e^{-y})^2} \cdot e^{-y} \cdot (-y)' =$$

$$\cancel{-} \frac{1}{(1 + e^{-y})^2} \cdot e^{-y} \cdot \cancel{(-1)} =$$

$$\frac{1}{(1 + e^{-y})} \cdot \frac{e^{-y}}{1 + e^{-y}} =$$

$$\sigma(y) \cdot \frac{1 + e^{-y} - 1}{1 + e^{-y}} =$$

$$\sigma(y) \cdot \left(\frac{1 + e^{-y}}{1 + e^{-y}} - \frac{1}{1 + e^{-y}} \right) =$$

$$\boxed{\sigma(y)(1 - \sigma(y))}$$