

Show that  $\sigma'(y) = \sigma(y)(1 - \sigma(y))$

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

$$\sigma'(y) = \frac{d}{dy} \left( \frac{1}{1+e^{-y}} \right) = \frac{(1+e^{-y}) \cdot 0 - 1(-e^{-y})}{(1+e^{-y})^2} = \frac{e^{-y}}{(1+e^{-y})^2}$$

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

$\parallel$   
1

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

$\parallel$   
 $\sigma(y)$