

## Lecture 8:

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

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

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

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

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