

Dennis Rulermand

Lecture 2 - Exercise 7

$$f(y) = \frac{7}{1 + e^{-y}}$$

$$f'(y) = \frac{\frac{d(7)}{dy} \cdot (1 + e^{-y}) - \frac{d(1 + e^{-y})}{dy} \cdot 7}{(1 + e^{-y})^2}$$

$$\frac{d(7)}{dy} = 0 \quad \frac{d(1 + e^{-y})}{dy} = -e^{-y}$$

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

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

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

$$\Rightarrow \underline{f'(y) = f(y) \cdot (1 - f(y))}$$