

Ex 2 c)

$$f(z) = -\log(\sigma(-z))$$

$$f'(z) = -1 \cdot \frac{1}{\sigma(-z)} \cdot (\sigma(-z) \cdot (1 - \sigma(-z))) \cdot (-1)$$

$$= 1 \cdot \frac{1 - \sigma(-z)}{1}$$

$$= \sigma(-z) - 1$$

$$= \frac{1}{1 - e^z} - 1 = \frac{1}{1 - e^z} - \frac{1 - e^z}{1 - e^z} = \frac{1 - (1 - e^z)}{1 - e^z} = \frac{e^z}{1 - e^z}$$

$$f'(z) = -1 \cdot \frac{1}{\sigma(z)} \cdot (\sigma(z) \cdot (1 - \sigma(z))) \cdot (-1)$$

$$= 1 - \sigma(z)$$

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

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

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

~~$$\log(x) = \frac{1}{x}$$
$$\sigma(z)' = \sigma(z) \cdot (1 - \sigma(z)) = \frac{1}{1 + e^z} \cdot \left(1 - \frac{1}{1 + e^z}\right)$$~~

$$f''(z) = \left(\frac{e^z}{1 + e^z}\right)'$$

$$= e^z \cdot \frac{1}{1 + e^z}$$

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

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

$$= \frac{e^z}{1 + e^z} - \frac{e^{2z}}{(1 + e^z)^2}$$

$$= \frac{e^z(1 + e^z) - e^{2z}}{(1 + e^z)^2}$$

d) - Typyler

~~$$f) C_1(x) = (\sigma(x) - 1)(\sigma(x) - 1)'$$~~

~~$$= (\sigma(x) - 1)' \cdot (\sigma(x) - 1) + 2$$~~

~~$$= 1 \cdot \sigma(x) (1 - \sigma(x)) \cdot 2(\sigma(x) - 1) \cdot 2$$~~

~~$$= 2 \sigma(x) (1 - \sigma(x)) \cdot (\sigma(x) - 1)$$~~

Ex 2 g)

$$c_2(x) = -\gamma \cdot \log(\sigma(\omega x)) + (1-\gamma) \cdot \log(1 - \sigma(\omega x))$$

$$\begin{aligned} -\gamma \cdot \log(\sigma(\omega x))' &= -\gamma \cdot \frac{1}{\sigma(\omega x)} \cdot \sigma'(\omega x) \cdot (1 - \sigma(\omega x)) \cdot \omega \\ &= -\gamma \cdot (1 - \sigma(\omega x)) \cdot \omega \end{aligned}$$

$$\begin{aligned} (1-\gamma) \cdot \log(1 - \sigma(\omega x))' &= (1-\gamma) \cdot \frac{1}{1 - \sigma(\omega x)} \cdot (-1) \cdot \sigma'(\omega x) \cdot (1 - \sigma(\omega x)) \cdot \omega \\ &= -(1-\gamma) \cdot \sigma(\omega x) \cdot \omega \end{aligned}$$

$$\Rightarrow c_2'(x) = -\gamma(1 - \sigma(\omega x)) \cdot \omega - (1-\gamma) \cdot \sigma(\omega x) \cdot \omega$$

$$c_2''(x) = -\gamma \cdot \sigma(\omega x) \cdot (1 - \sigma(\omega x)) \cdot (-1) \cdot \omega - (1-\gamma) \cdot \sigma(\omega x) \cdot (1 - \sigma(\omega x)) \cdot \omega$$