Problem 1.

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

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

Problem 2:

$$\frac{\partial J}{\partial x} = \frac{\partial J}{\partial Y} \cdot \frac{\partial Y}{\partial z} \cdot \frac{\partial z}{\partial x}$$

$\in \mathbb{R}^{m \times N_y}$ f' W

$$\frac{\partial J}{\partial W} = \frac{\partial J}{\partial Y} \cdot \frac{\partial Y}{\partial z} \cdot \frac{\partial z}{\partial W}$$

$$= \frac{\partial J}{\partial z} \cdot X$$

$$\frac{\partial J}{\partial b} = \frac{\partial J}{\partial Y} \cdot \frac{\partial Y}{\partial z} \cdot \underbrace{\frac{\partial z}{\partial b}}_{1}$$

$$= \frac{\partial J}{\partial z}$$