$$y' = M(x) = Linear(20,\ Sigmoid(Linear(W,\ b,\ x))) \tag{1}$$

$$a = Sigmoid(Linear(W,\ b,\ x)) \tag{2}$$

$$c = Linear(W,\ b,\ x) \tag{3}$$

$$\mathcal{L}_{MSE} = \frac{1}{N}\sum^{N}(y - y')^2 \tag{4}$$

,

$$W' = W - a \cdot \frac{(y - y')^2}{\partial W} \tag{5}$$

$$b' = b - a \cdot \frac{(y - y')^2}{\partial b} \tag{6}$$

$$\frac{(y - M(x))^2}{\partial W} = -2 \cdot (y - M(x)) \cdot \frac{M(x)}{\partial W} = \tag{7}$$

$$= -2 \cdot (y - M(x)) \cdot \frac{Linear(20, a)}{\partial a} \cdot \frac{a}{\partial W} = \tag{8}$$

$$= -2 \cdot (y - M(x)) \cdot 20 \cdot \frac{a}{\partial W} = \tag{9}$$

$$= -2 \cdot (y - M(x)) \cdot 20 \cdot \frac{e^{-c}}{(1 + e^{-c})^2} \cdot \frac{c}{\partial W} = \tag{10}$$

$$= -2 \cdot (y - M(x)) \cdot 20 \cdot \frac{e^{-c}}{(1 + e^{-c})^2} \cdot x \tag{11}$$

$$\frac{(y - M(x))^2}{\partial b} = -2 \cdot (y - M(x)) \cdot \frac{M(x)}{\partial b} = \tag{12}$$

$$= -2 \cdot (y - M(x)) \cdot \frac{Linear(20, a)}{\partial a} \cdot \frac{a}{\partial b} = \tag{13}$$

$$= -2 \cdot (y - M(x)) \cdot 20 \cdot \frac{a}{\partial b} = \tag{14}$$

$$= -2 \cdot (y - M(x)) \cdot 20 \cdot \frac{e^{-c}}{(1 + e^{-c})^2} \cdot \frac{c}{\partial b} = \tag{15}$$

$$= -2 \cdot (y - M(x)) \cdot 20 \cdot \frac{e^{-c}}{(1 + e^{-c})^2} \tag{16}$$