

# hw5

---

## Part 1

---

$$\begin{aligned}
 \frac{\partial J}{\partial w} &= \frac{\partial J}{\partial M_1} \frac{\partial M_1}{\partial w} \\
 &= -(y - \hat{y}^T) \frac{\partial O}{\partial M_1} \frac{\partial M_1}{\partial w} \\
 &= -(y - \hat{y}^T) f'(M_1 U + b_2) \text{diag}(U) f'(W x_{j:j+h-1} + b_1) X_{j:j+h-1}^T
 \end{aligned}$$