

$$\frac{\partial J}{\partial W_y} = \frac{\partial J}{\partial y} \frac{\partial y}{\partial W_y} = -\frac{1}{y} \frac{\partial y}{\partial W_y} = -\frac{\frac{1}{\sum e^{XW}} \sum e^{XW} e^{W_y X} X - e^{W_y X} e^{W_y X} X}{\left(\sum e^{XW}\right)^2} = \frac{1}{P} (XP - XP^2) = X(P - 1)$$