

$$\begin{aligned}
\frac{\partial y}{\partial x} &= \frac{\partial y}{\partial w_1} \frac{\partial w_1}{\partial x} \\
&= \left(\frac{\partial y}{\partial w_2} \frac{\partial w_2}{\partial w_1} \right) \frac{\partial w_1}{\partial x} \\
&= \left(\left(\frac{\partial y}{\partial w_3} \frac{\partial w_3}{\partial w_2} \right) \frac{\partial w_2}{\partial w_1} \right) \frac{\partial w_1}{\partial x} \\
&= \dots
\end{aligned}$$