Rowan Lochrin
COMP3308
Homework 9
9/5/17

1. (a)

$$\begin{aligned}
\frac{d}{dn}(a) =& \frac{d}{dn}((e^n + e^{-n})(e^n - e^{-n})^{-1}) \\
=& (e^n + e^{-n})'(e^n - e^{-n})^{-1} + (e^n + e^{-n})((e^n - e^{-n})^{-1})' \\
=& (e^n - e^{-n})(e^n - e^{-n})^{-1} - (e^n + e^{-n})(e^n - e^{-n})^{-2}(e^n - e^{-n})' \\
=& 1 - (e^n + e^{-n})^2(e^n - e^{-n})^{-2} \\
=& 1 - ((e^n + e^{-n})(e^n - e^{-n})^{-1})^2 \\
=& 1 - a^2
\end{aligned}$$

(b)

$$\begin{aligned}
\Delta W_{ji} =& \eta \delta_i O_j \\
=& \eta (d_i - O_i) f'(net_i) O_j \\
=& \eta (d_i - O_i)(1 - f(net_i)^2) O_j \\
\Delta W_{kj} =& \eta \delta_j O_k \\
=& \eta (1 - O_k)^2 (W_{ji} \delta_j) O_k
\end{aligned}$$