

Neural Networks 1
G. Lendaris
October 16, 2002
SOLUTIONS FOR ASSIGNMENT #1

#1 a,b

$$E = -5.8A - 3.1B \qquad F = -19A - 4B$$

$$\frac{\partial E}{\partial A} = -5.8 \qquad \frac{\partial F}{\partial A} = -19$$

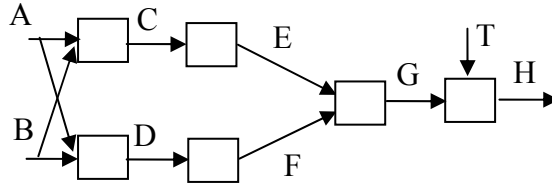
$$\frac{\partial E}{\partial B} = -3.1 \qquad \frac{\partial F}{\partial B} = -4$$

#1c

$$\frac{\partial F}{\partial A} = \frac{\partial F}{\partial C} \frac{\partial C}{\partial A} + \frac{\partial F}{\partial D} \frac{\partial D}{\partial A} = (-6)(4) + (1)(5) = -19$$

$$\frac{\partial E}{\partial B} = \frac{\partial E}{\partial C} \frac{\partial C}{\partial B} + \frac{\partial E}{\partial D} \frac{\partial D}{\partial B} = (1.3)(1) + (-2.2)(2) = -3.1$$

#2a



#2 b,c

$\frac{\partial E}{\partial C} = -e^{-C}$ $\frac{\partial F}{\partial D} = F(1-F)$	$\frac{\partial H}{\partial w_1} = \frac{\partial H}{\partial G} \frac{\partial G}{\partial E} \frac{\partial E}{\partial C} \frac{\partial C}{\partial w_1}$ $\frac{\partial H}{\partial G} = 1$ $\frac{\partial G}{\partial E} = w_5$ $\frac{\partial E}{\partial C} = -e^{-C}$ $\frac{\partial C}{\partial w_1} = A$ $\frac{\partial H}{\partial w_1} = -w_5 A e^{-C}$	$\frac{\partial H}{\partial w_4} = \frac{\partial H}{\partial G} \frac{\partial G}{\partial F} \frac{\partial F}{\partial D} \frac{\partial D}{\partial w_4}$ $\frac{\partial H}{\partial G} = 1$ $\frac{\partial G}{\partial F} = w_6$ $\frac{\partial F}{\partial D} = F(1-F)$ $\frac{\partial D}{\partial w_4} = B$ $\frac{\partial H}{\partial w_4} = w_6 B F(1-F)$	$\frac{\partial H}{\partial w_4} = \frac{\partial H}{\partial G} \left(\frac{\partial G}{\partial E} \frac{\partial E}{\partial C} \frac{\partial C}{\partial A} + \frac{\partial G}{\partial F} \frac{\partial F}{\partial D} \frac{\partial D}{\partial A} \right)$ $\frac{\partial C}{\partial A} = w_1$ $\frac{\partial D}{\partial A} = w_3$ $\frac{\partial H}{\partial A} = -w_1 w_5 e^{-C} + w_3 w_6 F(1-F)$
--	---	---	---