

# HW #10

1.  $10 \cdot 1000 + 1000 \cdot 1$   
 $= 3,016,000, \approx 3 \text{ mil parameters}$

2.  ~~$e^{+2+\frac{1}{e}}$~~   $\rightarrow$   ~~$e^{+2+\frac{1}{e}}$~~   
 $P(y_1) = \frac{e}{e^{+2+\frac{1}{e}}} = [0.534]$   $y_1$

3.  $h_1 = \text{ReLU}(x_1 - x_2)$   $(x_1, x_2) \rightarrow \text{input}$   
 $h_2 = \text{ReLU}(x_2 - x_1)$   
 $y = h_1 + h_2 \rightarrow \text{output}$

4. a.  $h_1 = \text{ReLU}(x_1 + x_2)$   $x_1 + x_2 \quad 0, 1, 1, 2$   
 $h_2 = \text{ReLU}(x_1 + x_2 - 1)$   $h_1(x_1 + x_2) \Rightarrow 0, 1, 1, 2$   
 $y = h_1 - h_2$   $h_2(x_1 + x_2 - 1) \Rightarrow 0, 0, 0, 1$   
 $y = h_1 - h_2 \Rightarrow 0, 1, 1, 1$   
 $\text{OR}(x_1, x_2) = \begin{cases} 0 & \text{if } x_1 = 0 \text{ and } x_2 = 0 \\ 1 & \text{otherwise} \end{cases}$

b.  $h_1 = \text{ReLU}(x)$   $h_1 \begin{cases} x & \text{if } x \geq 0 \\ 0 & \text{if } x < 0 \end{cases}$   
 $h_2 = \text{ReLU}(-x)$   $h_2 \begin{cases} x & \text{if } x \leq 0 \\ 0 & \text{if } x > 0 \end{cases}$   
 $y = h_1 + h_2$   $y \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$   
 $y = |x|$