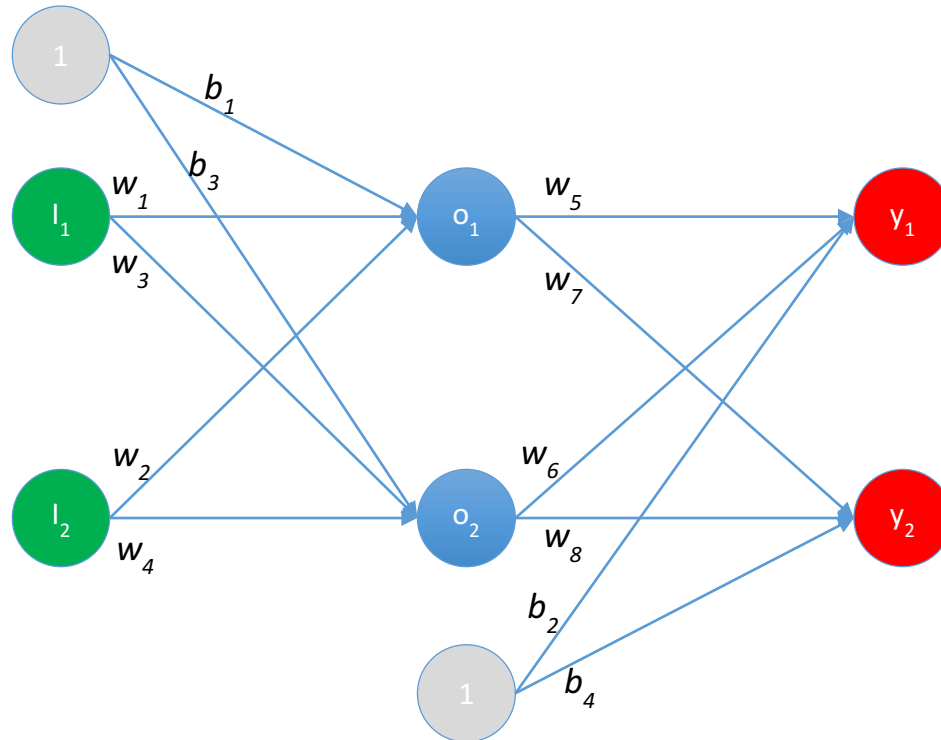


Consider the neural network below with two inputs, two hidden neurons, two output neurons. Additionally, the hidden and output neurons will include a bias.



The task for this homework is to hand train the MLP as follows:

Training sample:  $I_1 = 0.05$ ,  $I_2 = 0.10$ ,  $y_1 = 0.01$ ,  $y_2 = 0.99$

Initial weights and biases:

$w_1 = 0.15$	$w_5 = 0.40$	$b_1 = b_3 = 0.35$
$w_2 = 0.20$	$w_6 = 0.45$	$b_2 = b_4 = 0.60$
$w_3 = 0.25$	$w_7 = 0.50$	
$w_4 = 0.30$	$w_8 = 0.55$	

1. Calculate the weight updates for  $w_1$ ,  $w_2$ ,  $w_3$ ,  $w_4$ ,  $w_5$ ,  $w_6$ ,  $w_7$ ,  $w_8$ ,  $b_1$ ,  $b_2$ ,  $b_3$  and  $b_4$  after the first backward pass is complete.
2. Using the updated weights calculate the total error using the same sample? ( $I_1=0.05$ ,  $I_2=0.1$ ,  $y_1=0.01$ ,  $y_2=0.99$ )
  - a. How does it compare to the initial total error? (compare  $E_{total}$  error after the first forward pass to  $E_{total}$  after the second forward pass)

\* You must show the break down of the calculations for each update. Refer to the slides from Wednesday's class for a step-by-step break down.