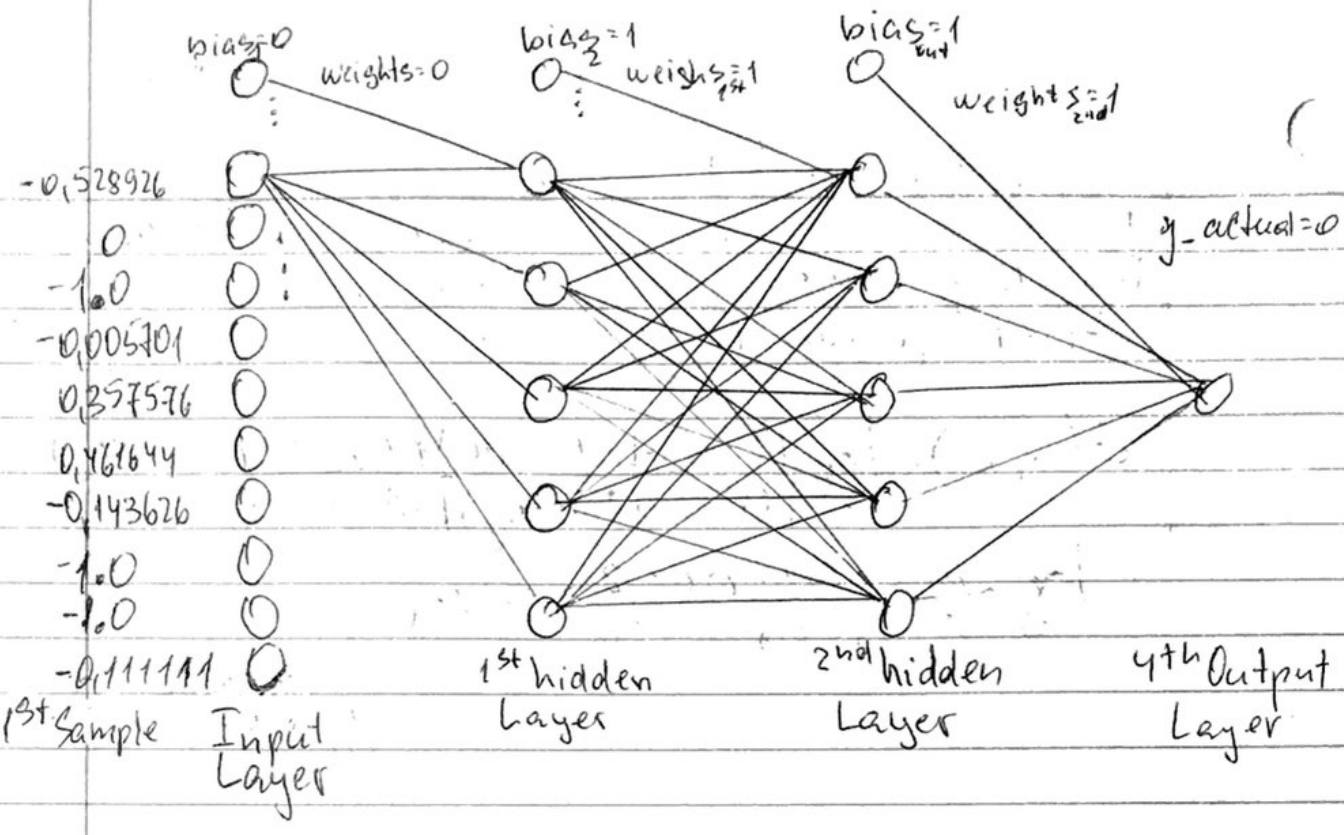

I) Forward Pass:

- All the outputs from the 1st hidden layer will be the same:

$0 \cdot 0 + (-0,528526) \cdot 0 + 0 \cdot 0 + (-1,0) \cdot 0 + (-0,005701) \cdot 0 + 0,357576 \cdot 0 + 0,461644 \cdot 0 +$
$+ (-0,143626) \cdot 0 + (-1,0) \cdot 0 + (-1,0) \cdot 0 + (-0,111111) \cdot 0 = 0$

Activation Sigmoid: $\boxed{\frac{1}{1+e^{-x}}} \Rightarrow \frac{1}{1+e^{0}} = \frac{1}{2}$

- All the inputs to the 2nd hidden layer will be the same:

$1 \cdot 1 + \frac{1}{2} \cdot 1 + \frac{1}{2} \cdot 1 + \frac{1}{2} \cdot 1 + \frac{1}{2} \cdot 1 + \frac{1}{2} \cdot 1 = 1 + 5 \cdot \frac{1}{2} = \frac{7}{2}$

$\frac{1}{1+e^{-\frac{7}{2}}} = 0,970687769$ (the output of each neuron in the 2nd hidden layer)

- Output:

$1 \cdot 1 + 5 \cdot (1 \cdot 0,970687769) = 5,853438846$

$y\text{-predicted} = \frac{1}{1+e^{-5,853438846}} = 0,997138201$

$MSE = \frac{1}{N} \sum_{i=1}^{N} (y_i - \hat{y}_i)^2 \Rightarrow MSE = (0 - 0,997138201)^2 =$
$= 0,994284591$

II) Backpropagation: $\eta = 0,01$

- Output layer weights should be the same:

$\delta_j = output_j (1 - output_j)(actual_j - output_j)$

$\delta_{out} = y\_predicted(1 - y\_pred)(y\_actual - y\_pred) =$
$= 0,997138201(1 - 0,997138201)(-0,997138201) = -0,002845443$

$w_{bias\,out,new} = w_{bias\,out,curr} + \eta \delta_{out} bias = 1 + 0,01 \cdot (-0,002845443) \cdot 1 = 0,999971546$

$w_{2nd,new} = w_{2nd,curr} + \eta \cdot \delta_2 \cdot N2 = 1 + 0,01 \cdot (-0,002845443) \cdot 0,970687769 =$
$= 0,99997238$

$\delta_{hidden} = output_j (1 - output_j) \sum w_{jk} \delta_j$

$\delta_{2^{nd}\,hidden} = 0,970687769(1 - 0,970687769) \cdot 1 \cdot (-0,002845443) =$
$= -0,000080961$

$w_{bias\,2,new} = w_{bias\,2,curr} + \eta \cdot \delta_{2^{nd}\,hidden} \cdot bias = 1 + 0,01 \cdot (-0,000080961) \cdot 1 =$
$= 0,999999919$

$w_{1st,new} = w_{1st,curr} + \eta \cdot \delta_{2^{nd},hidden} \cdot N1 = 1 + 0,01(-0,000080961) \cdot \frac{1}{2} =$

$= 0,999999595$