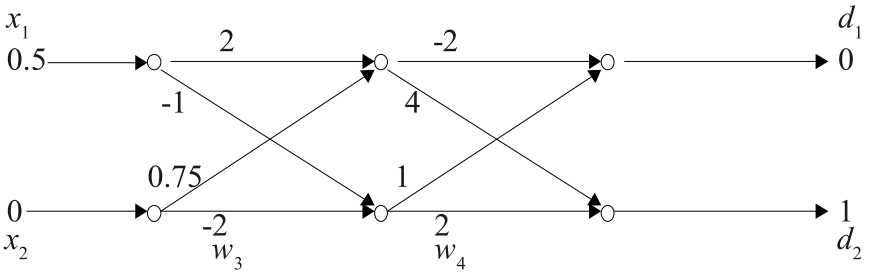
1. On page 148-149, Haykin discusses how to select initial weights. He notes that LeCun suggested the standard deviation of the weights for all syanpses coming into a particular node *j*, namely σ_{w_j}, should be chosen such that $\sigma_{w_j} = m_j^{-1/2}$ where m_j is the number of input synapses to node *j*.

   Find the region [-*k*,*k*] such that has standard deviation $m_j^{-1/2}$.

2. Consider the following MLP discussed in class.
   Use back propagation to find updated values for weights w_3 and w_4 given the input and desired output shown.



3. (Haykin problem 4.1.)
   Figure P4.1 shows a neural network involving a single hidden neuron for solving the XOR problem; this network may be viewed as an alternative to that considered in Section 4.5. Show that the network of Figure P4.1 solve the XOR problem by constructing (a) decision regions, and (b) a truth table for the network.

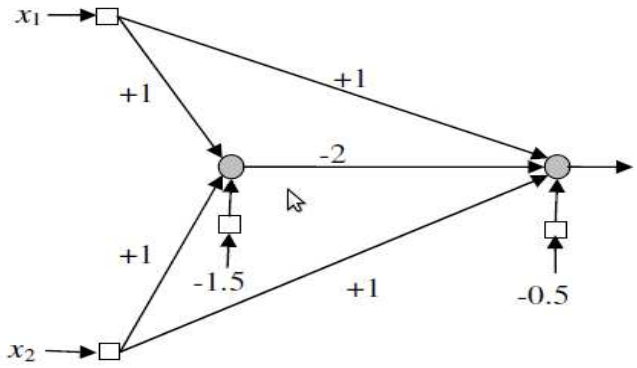


   Figure P4.1

4. (Haykin problem 4.3.)
   The momentum constant α is normally assigned a positive value in the range $0 < \alpha \leq 1$. Investigate the difference that would be made in the behavior of Eq. (4.43) with respect to time *t* if α were assigned a negative value in the range $-1 \leq \alpha < 0$.