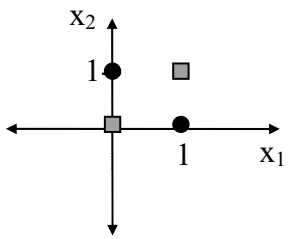
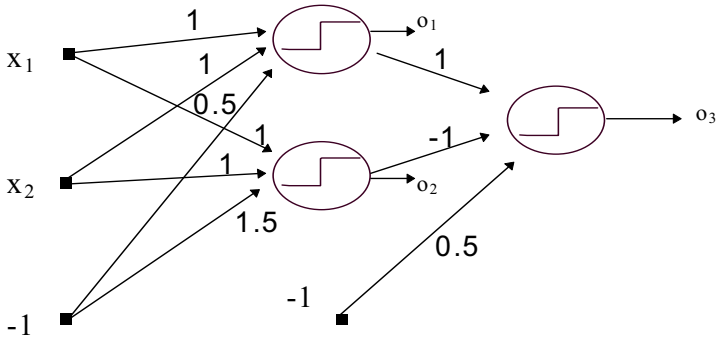
FIT5186 Examples from Lecture 3

Example

XOR Classification:
(one of many that will work)

- CLASS output = 1 ■ CLASS output = 0





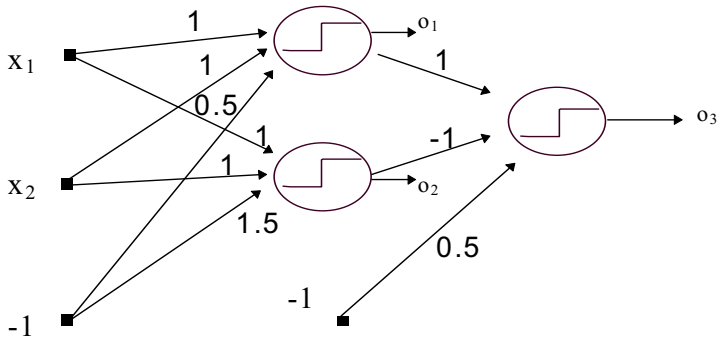
TEST:

If $x_1 = 1$ and $x_2 = 1$ then $output1 = 1, output2 = 1$ so $output3 = 0$ ✓
If $x_1 = 1$ and $x_2 = 0$ then $output1 = 1, output2 = 0$ so $output3 = 1$ ✓
If $x_1 = 0$ and $x_2 = 1$ then $output1 = 1, output2 = 0$ so $output3 = 1$ ✓
If $x_1 = 0$ and $x_2 = 0$ then $output1 = 0, output2 = 0$ so $output3 = 0$ ✓

O.K. So it classifies!

But why?

And how do we determine the weights?

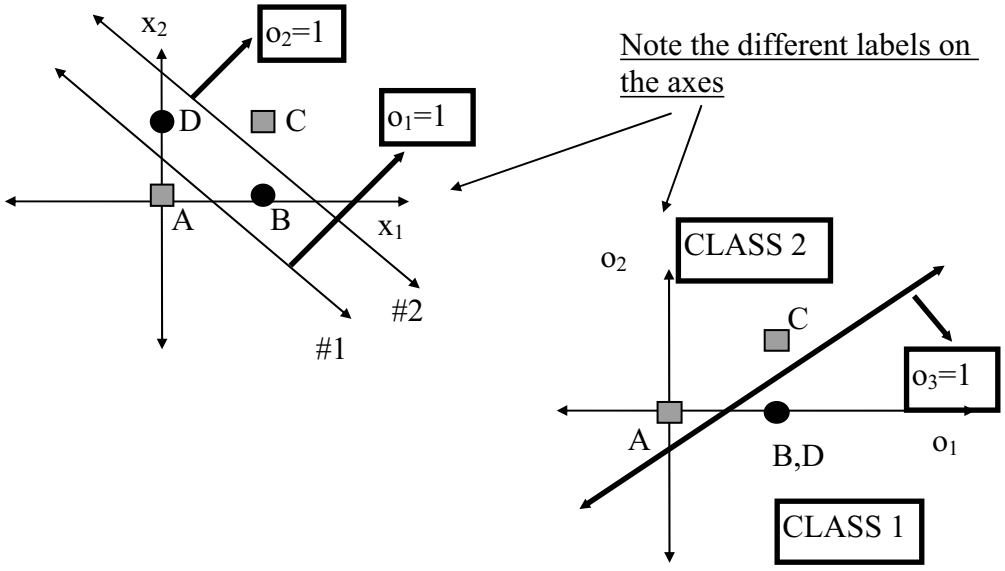


$o_3 = 1 \Rightarrow$ CLASS 1 $\qquad$ $o_3 = 0 \Rightarrow$ CLASS 2

At Perceptron #1: $x_1 + x_2 - 0.5 = 0$

At Perceptron #2: $x_1 + x_2 - 1.5 = 0$

At Perceptron #3: $o_1 - o_2 - 0.5 = 0$



The outputs of the hidden neurons help to partially classify the data (ie. they discover that points B & D trigger identical "firings"). The final classification (once the data has been linearly separated) occurs in the output layer.