ASSIGNMENT 3

Due September 30, 2014 (before start of class)

Problem 1

For the following training set:

q	$\mathbf{s}^{(q)}$	$t^{(q)}$
1	[1 1 1]	1
2	[1 1 -1]	-1
3	[1 -1 1]	-1
4	[-1 1 1]	-1

if we assume zero initial weights and bias, Hebb's rule gives $\mathbf{w} = [0\ 0\ 0]$ and $b = -2$. Therefore for any input vector, the signal received by the output neuron is always given by

$$y_{\text{in}} = b + \mathbf{xw} = -2.$$

Thus this single-layer NN with a single output neuron fails to correctly classify even the original training patterns.

In this assignment, we re-visit this problem but this time using the perceptron learning rule instead of Hebb's rule. Since we know that the problem is linearly separable and so, according to the Perceptron Convergence Theorem, we should be able to find a correct set of weights and bias.

Here gain we assume zero initial weights and bias.

1. How many steps does it take for convergence?
2. What is the final set of weights and bias?
3. Make sure you show a table displaying every step in the Perceptron algorithm.

You can do this assignment either by hand or by writing a computer program. The total number of steps is actual less than 30.