1. Let $\mathbf{x} = (x_1, x_2)$, with $x_i \in \{0, 1\}$

Consider the Boolean function

$f(\mathbf{x}) = x_1$ AND x_2 :

$f(\mathbf{x}^1) = f((0,0)) = 0$

$f(\mathbf{x}^2) = f((0,1) = 0$

$f(\mathbf{x}^3) = f((1,0) = 0$

$f(\mathbf{x}^4) = f((1,1) = 1$

(a) Give weights for a perceptron that computes this function. (Include bias unit and weight.) *Do this by inspection, not by applying perceptron training!*

(b) Give the slope and intercept, and sketch the separation line defined by the perceptron, along with the four points defined by the instances $\mathbf{x}^1$ to $\mathbf{x}^4$.

(c) What is your perceptron's threshold? What is its bias?

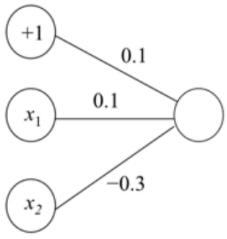
2. Let the following be a training set, {(**x**, t)}

((0,0), 0)

((0,1), 1)

((1,1), 1)

Let $\mathbf{w} = \{w_0, w_1, w_2) = \{0.1, 0.1, -0.3\}$



Perceptron learning rule:

$$w_i \leftarrow w_i + \Delta w_i$$

where

$$\Delta w_i = \eta\,(t^k - y^k)x_i^k$$

(a) What is the accuracy of the perceptron on the training data before training?

(b). Using the Perceptron learning rule, train the perceptron for one epoch, setting η = 0.2.

What are the weights after training for one epochs?

(c) What is the accuracy of the perceptron on the training data after training for one epoch? Did the accuracy improve?