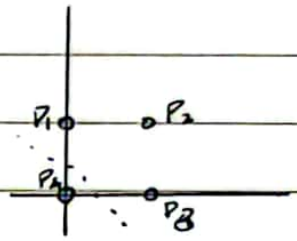
Question 1 Perceptron Algorithm

Boolean OR function $f(x_1, x_2) = x_1$ OR x_2
where $f(0,0)$ = false, $f(1,0)$ = True, $f(0,1)$ = True, $f(1,1)$ = True

$P_1(0,1) = 1$
$P_2(1,1) = 1$
$P_3(1,0) = 1$
$P_4(0,0) = -1$



1) From observation we can see that both sides are linearly seperable.

2) For the Perceptron algorithm assume = $x_2 = 1/2$
Weights are $w_0 = 0$ $w_2 = 1$ $w_0 = -1/2$

1. $w_1x_1 + w_2x_2 + x_0$

$P_1 = 0.0 + 1.1 - 1/2 = 1/2 \Rightarrow 1$
$P_2 = 0.1 + 1.1 - 1/2 = 1/2 \Rightarrow 1$
$P_3 = 0.1 + 1.0 - 1/2 = -1/2 \Rightarrow -1$ Incorrect
$P_4 = 0.0 + 1.0 - 1/2 = -1/2 \Rightarrow -1$

2. Updating $x^{T+1} = w^T + t_i x_i$
$w_1 = 0 + 1.1 = 1$ $w_2 = 1 + 1.0 = 1$ $w_0 = -1/2$

$w_1x_1 + w_2x_2 + x_0$

$P_1 = 1.0 + 1.1 - 1/2 = 1/2 \Rightarrow 1$
$P_2 = 1.1 + 1.1 - 1/2 = 1\,1/2 \Rightarrow 1$
$P_3 = 1.1 + 1.0 - 1/2 = 1/2 \Rightarrow 1$
$P_4 = 1.0 + 1.0 - 1/2 = -1/2 \Rightarrow -1$

∴ Decision Boundry = $x_1 + x_2 - 1/2 = 0$