#solution - 1

↳ As it is given that we need to assume weight vector of initial division boundary

$$w^T x = 0 \quad \text{as} \quad w = [1, 1]$$

↳ For each sample x_i in dataset we need to

1. Compute $\hat{y} = sign(w^T x_i)$
2. If the predicted $\hat{y}$ is not equal to y_i, need to update the weight vector as

$$\boxed{w = w + y_i * x_i}$$

And 3. this will be repeated till no misclassified samples we will get.

Iteration	sample	x_1	x_2	y_i	$\hat{y}$	w	$w + y_i * x_i$
0	-	-	-	-	-	[1, 1]	
1	1	1	1	+1	+1	[1, 1]	
	2	-1	-1	-1	-1	[1, 1]	
	3	0	0.5	-1	+1	[1, 0.5]	[1,1] + (-1)[0, 0.5]
	4	0.1	0.5	-1	+1	[.9, 0]	[1, .5] + (-1)[.1, .5]
2	1	1	1	+1	+1	[0.9, 0]	
	2	-1	-1	-1	-1	[0.9, 0]	
	3	0	0.5	-1	-1	[0.9, 0]	
	4	0.1	0.5	-1	-1	[0.9, 0]	

After two iterations all samples are correctly classified.

The final decision boundary is defined by the weight vector w after convergence.

In this case, the final weight vector after convergence is $w = [0.9, 0]$. The decision boundary eqn is $w^T x = 0$, which can be written as: $0.9x_1 + 0x_2 = 0$.