**Perceptron Example**   *(find and work with a partner)*

The example below shows 6 training data points. We wish to find a separating hyperplane using the perceptron algorithm. We will begin with $\vec{w} = [0, 1, 0.5]^T$ and $\alpha = 0.2$. We normally use $\alpha = 1$ so we don't even need to consider it (α only affects the magnitude of $\vec{w}$, not the classifications), but using a small value here will keep the numbers and graphing more manageable.

1. Beginning with the plot below, consider the points in order. From $\vec{x}_1$ and $\vec{x}_2$, determine what actions we will take and update the weight vector. Graphically show how the hyperplane is updated.
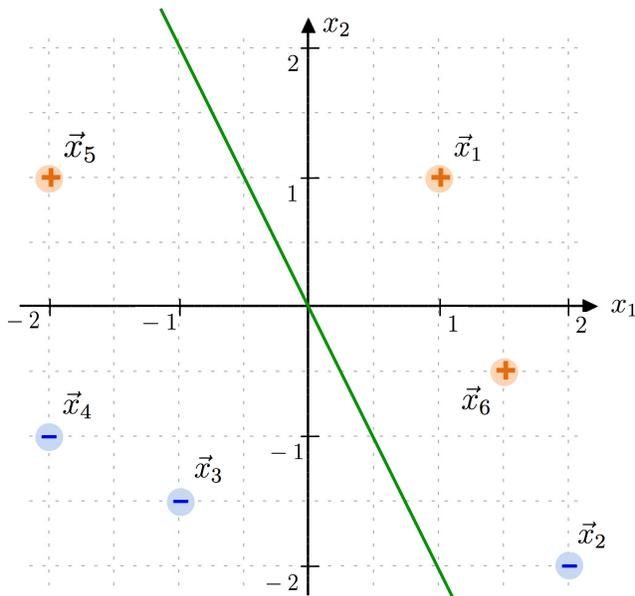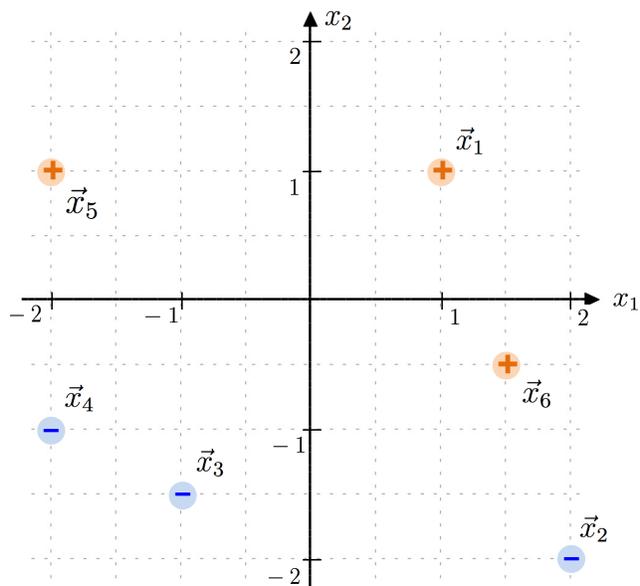

2. This is what the hyperplane looks like after $\vec{x}_1$ and $\vec{x}_2$. Now consider $\vec{x}_3$, $\vec{x}_4$, and $\vec{x}_5$. What is the weight vector after these points are considered? Sketch out the vector addition on this plot too.
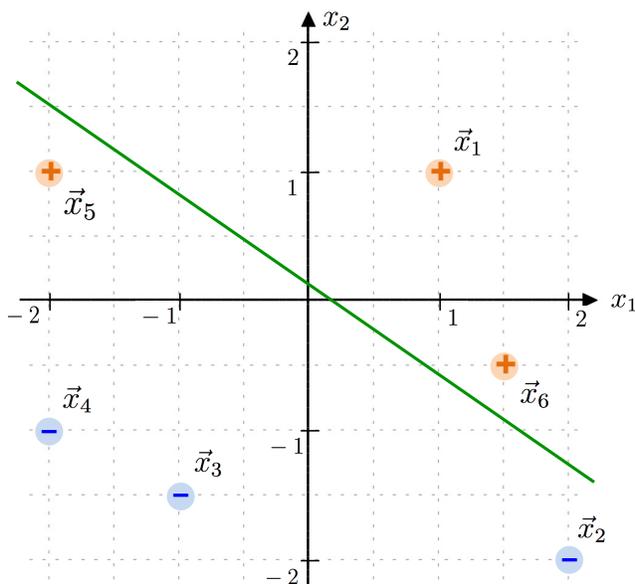
3. Draw the resulting hyperplane from your previous step. Now consider $\vec{x}_6$ and update the weight vector using this point.
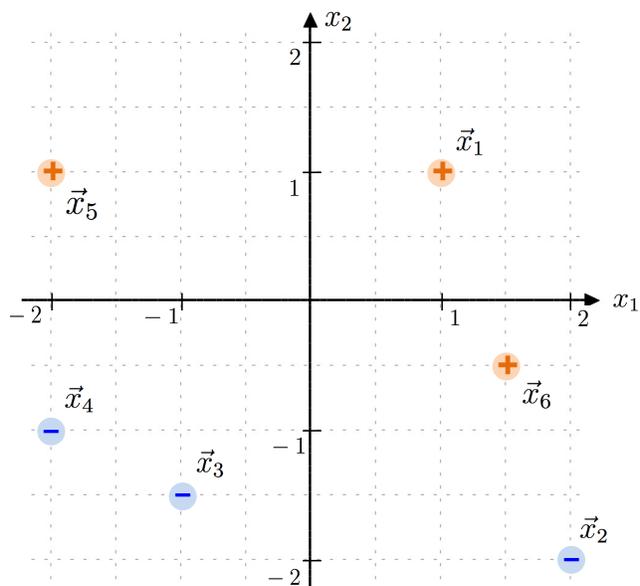
4. Finally, draw the final hyperplane!