HW #6 Due: 5/24/2022

1. Please identify the support vectors and the corresponding $\mathbf{w}$ and b for the following training samples: $\{[1 \quad 1]^T, [2 \quad 2]^T, [3 \quad 3]^T\} \in C_+$ and $\{[-1 \quad -1]^T, [-3 \quad 2]^T, [-5 \quad -5]^T\} \in C_-$.
2. In the Adaboost lecture notes, we have an example of 5 2-dimensional samples. Continue the calculation for the second iteration.
3. We mentioned in the lecture (back propagation) that the perceptron with a loss function of $J(\boldsymbol{w}) = |z_k d_k| - z_k d_k$ can be trained by using the following updating rule:

$$\boldsymbol{w}(k+1) = \boldsymbol{w}(k) + \begin{cases} 0, & \text{if } z_k d_k > 0 \\ \eta \boldsymbol{x}_k d_k, & \text{otherwise} \end{cases}$$

   Show that this algorithm is directly derived from the stochastic gradient descent algorithm.
4. Use the kernel SVM to classify the Iris data set. As usual, take 70% of the samples as training set and the rest 30% for testing. To simplify the problem, use the default values for *C* and γ. Report the average accuracy after 10 trials.
5. Repeat problem 4 with the Adaboost classifier. When compare the accuracy obtained from problem 4 and this problem, which one is better?