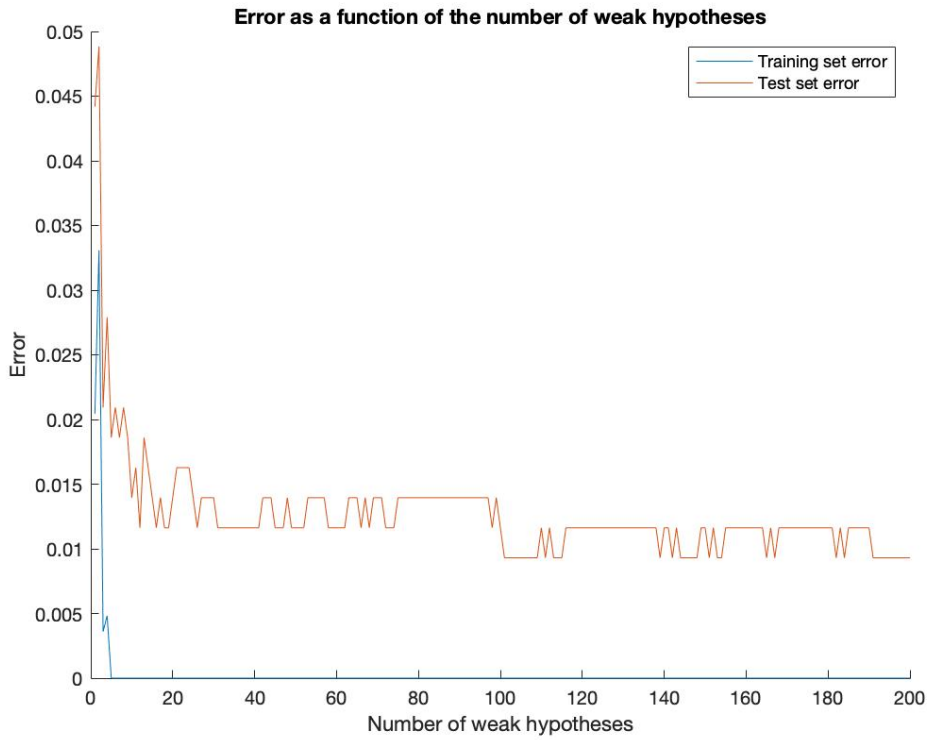
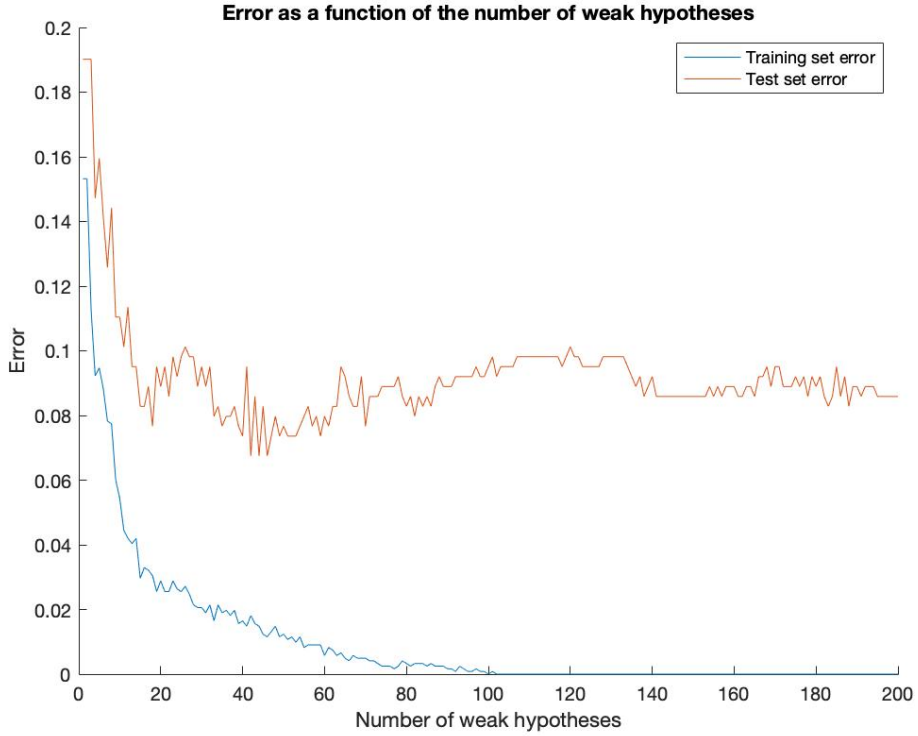
AdaBoost

Error as a function of the number of weak hypotheses in AdaBoost applied on one-vs-three



Error as a function of the number of weak hypotheses in AdaBoost applied on three-vs-five



From the graphs above, we can observe that in both cases (one-vs-three and three-vs-five), as the number of weak hypotheses increases, training set error decreases, and finally converges to zero, namely, there is no in sample error and we are making perfect predictions in the training set. Also, as the number of weak hypotheses increases, test set error decreases initially, and when the number of weak hypotheses reaches a threshold, test set error basically remains unchanged and fluctuates around a certain value finally. In the second case (three-vs-five), it can be noticed that when number of hypotheses reaches 90, the test set error even slightly increases. Moreover, we need to note that in both cases test set error is always greater than training set error. This is because in sample error is much more optimistic than out of sample error.

To sum up, given the observation, it can be concluded that when the number of weak hypotheses increases, the performance of AdaBoost will also increase. When the number of weak hypotheses is big enough, the performance will converge finally.