CS 146 - Homework 4

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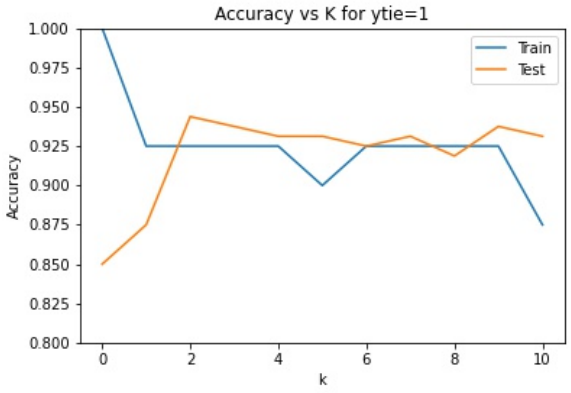
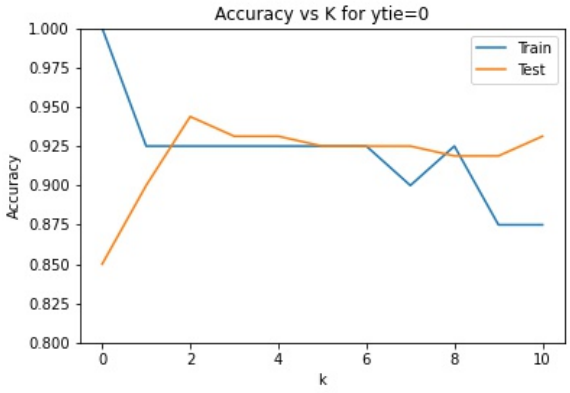
Question 1.

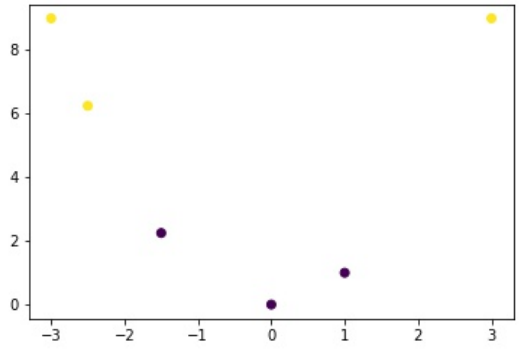
For all plots, the accuracy is a bit lower at low k, peaking at a midrange k, and then decreasing again when k is high. This is expected as low k corresponds to overfitting and high k corresponds to underfitting. Whether the tiebreaker is one class or another does not significantly the trends of either graph, of course not affecting the odd k accuracies at all. This would make sense for a dataset where there are not many ties that need to be broken in the first place.





Question 2.

The data does appear to be linearly separable.



The two support vectors are the points (-2.5, 6.25) and (-1.5, 2.25). The separating line goes through the midpoint (-2, 4.25). The vector connecting them is in the direction (1, -4) so it has slope -4 for x_2 wrt x_1, which means the normal vector to the plane has the slope $1/4$ for x_2 wrt x_1 and goes through the midpoint. Thus the equation of the line is $x_2 - 4.25 = \frac{1}{4}(x_1 + 2)$ so the equation of the plane is $\boxed{4x_2 + x_1 - 19 = 0.}$