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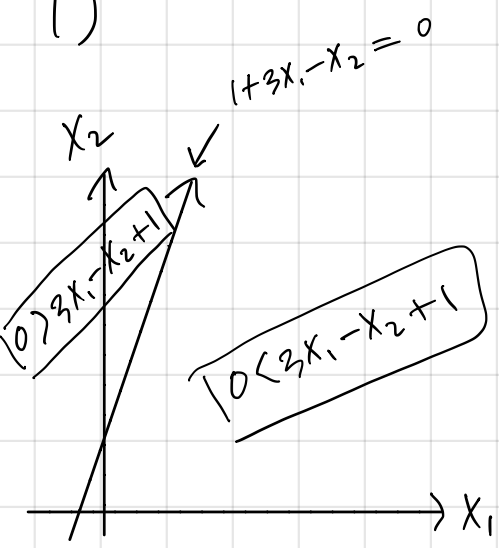
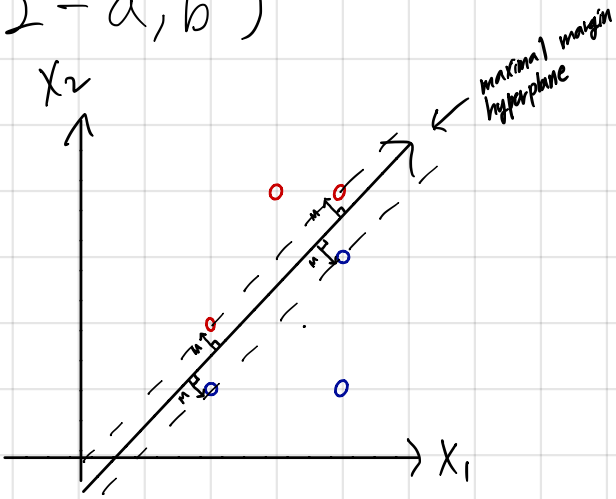
Set: 3M

1)



2 - a, b)



Part 1)

c)

The two red dots that are closest to the hyperplane are (2,2), (4,4).
So the line passes through the two points is $X_2 = X_1$.

And the two blue dots that are closest to the hyperplane is (2,1), (4,3).
So the line passes through the two dots is $X_2 = X_1 - 1$

The distance between the two lines is 2M.
Therefore, $2M = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
$M = \frac{\sqrt{2}}{4}$

Let the equation for the maximal margin hyperplane be $X_1 - X_2 + k = 0$
The distance between $X_2 = X_1 + k$ and $X_2 = X_1$ is M. Therefore,
$-\frac{k\sqrt{2}}{2} = \frac{-\sqrt{2}}{4}$, $\therefore k = -\frac{1}{2}$

Therefore the equation for the maximal margin hyperplane is
$X_1 - X_2 - \frac{1}{2} = 0$

d)

Plug in the test sample (3.5, 2) to the equation.
$3.5 - 2 - 0.5 > 0$
$\Rightarrow$ Blue.