Spring - 2017 Final

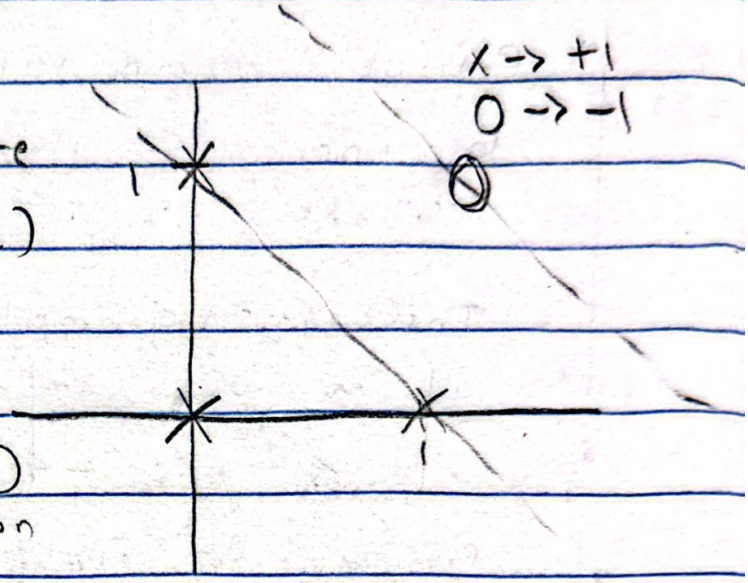
Q3] SVM

a] please ~~too~~ refer to midterm solution for dual formulation (spring 2016 midterm-1)

b] Therefore,

Support vectors are

(0, 1), (1, 0), (1, 1)



$\therefore \alpha_1 = 0$

$\alpha_4 = \alpha_2 + \alpha_3$ — (1)

↳ dual form condition

Dual form

$\Rightarrow -\frac{1}{2}[\alpha_2^2(1,0\cdot1,0) + \alpha_3^2(1,0\cdot1,0) + \alpha_4^2(1,1\cdot1,1) + 2\alpha_2\alpha_3(1,0\cdot1,0) - 2\alpha_2\alpha_4(1,1\cdot1,0) - 2\alpha_3\alpha_4(1,1\cdot1,0)] + \alpha_2 + \alpha_3 + \alpha_4$

$\Rightarrow L(\alpha) = -\frac{\alpha_2^2}{2} - \frac{\alpha_3^2}{2} - \alpha_4^2 + \alpha_2\alpha_4 + \alpha_3\alpha_4 + \alpha_2 + \alpha_3 + \alpha_4 = 0$

$\frac{\partial L(\alpha)}{\partial \alpha_2} = 0, \quad -\alpha_2 + \alpha_4 + 1 = 0, \quad \alpha_4 = 1 + \alpha_2$ — (2)

$\frac{\partial L(\alpha)}{\partial \alpha_3} = 0, \quad \alpha_4 = 1 + \alpha_3$ — (3)

Solve From (1) (2) (3) $\alpha_2 = \alpha_3 = 1, \quad \alpha_4 = 2$

(4)