Fall-2019 midterm-1

Q3] SVM

a) Primal problem

Objective function

$$\min_{w, w_0} \frac{1}{2}\|w\|^2$$

wrt constraints,

$$y_i(w^T x_i + w_0) \geq 1$$

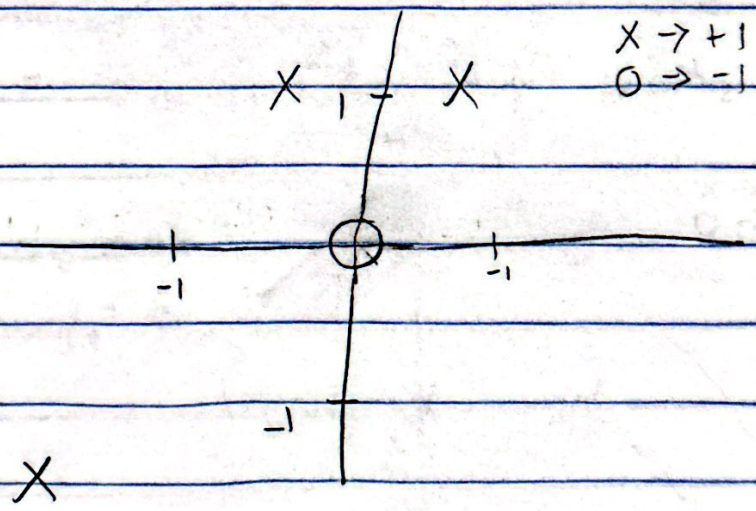
$$\Rightarrow -(1 \cdot w_1 + w_2 \cdot 1 + 0 \cdot 0 + 0 \cdot 1 + w_0) \geq 1$$

$$(1 \cdot w_1 + w_2 \cdot 1 + -1/3 \cdot 1 + w_0) \geq 1$$

$$(1 \cdot w_1 + w_2 \cdot 1 + 1/3 \cdot 1 + w_0) \geq 1$$

$$(-2 \cdot 1 + -2 \cdot 1 + w_1 + w_2 + w_0) \geq 1$$

b)



NO,

Data is not linearly seperable.

Any quadratic kernal should work fine like $(1 + x^T x)^2$

$$\sum_{i=1}^{4}\sum_{j=1}^{4} \alpha_i \alpha_j y_i y_j (1 + x_i^T x_j)^2$$

given $-\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 = 0$ Claim too lazy to expand, plz refer to [illegible]