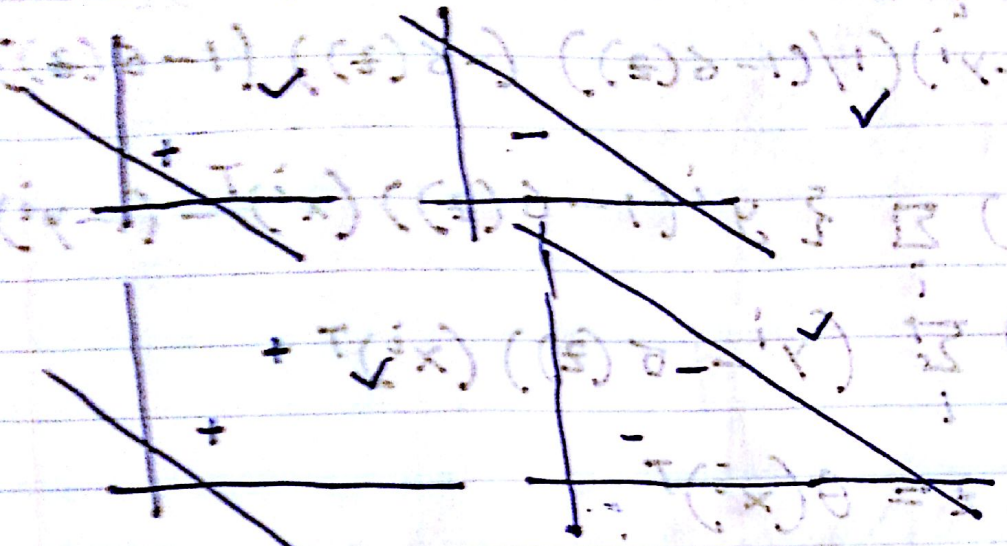
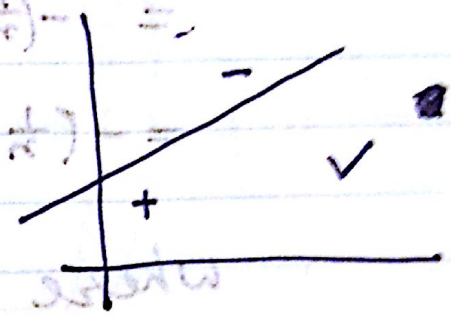
Problem 2.

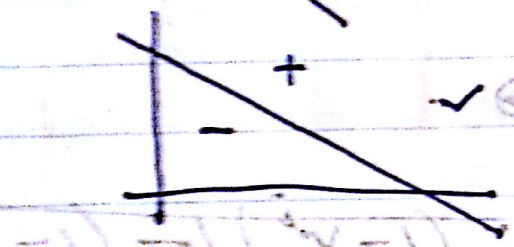
$T(a+bx_1)$

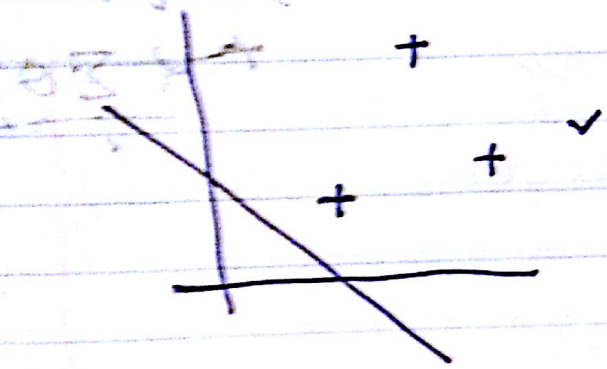


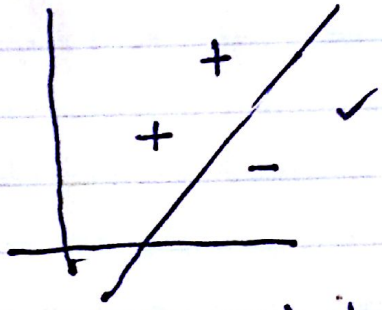
1 point shattered

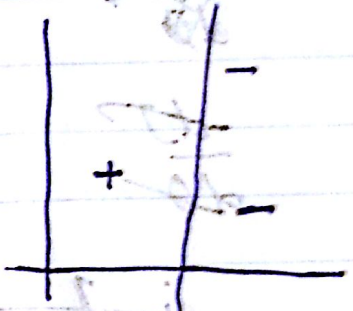


2 point shattered

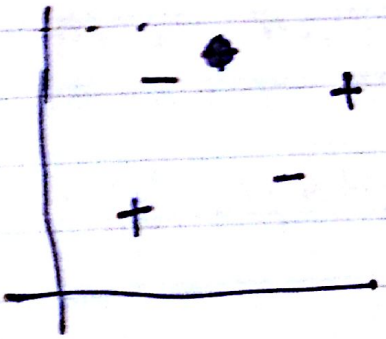






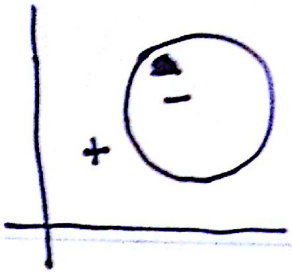


3 points shattered.



not possible ⇒ VC dimension = 3.

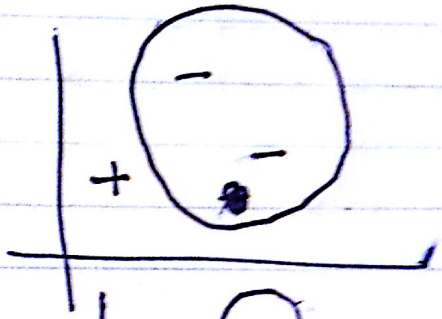
(b)



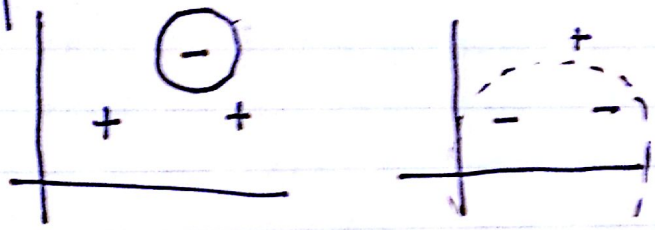
$(x_1-a)^2+(x_2-b)^2+c$

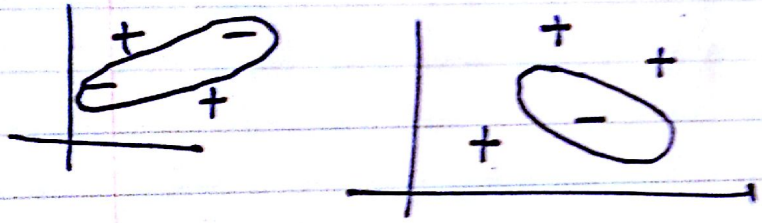
ellipse

yes we can shatter 2 points as we have the flexibility of choosing a, b.



for all combinations 3 points shattered





→ ~~not~~ possible

VC dim = 4

(c) $(ab)x_1+(c/a)x_2 \gtrless 0$

$\Rightarrow a^2b\,x_1 + c x_2 \gtrless 0$

It is a hyperplane in 3-D space but goes through origin

a, b will be shattered but (c) (d) will not be shattered because we can't control the intercept as it has to go through origin.