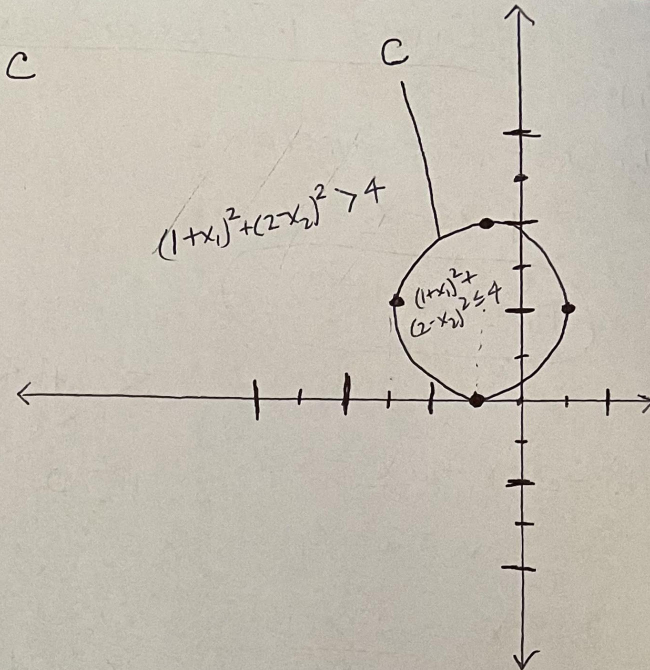
2.)

(a) Sketch the curve: $(1+x_1)^2+(2-x_2)^2=4=C$

we rewrite as: $\dfrac{(x_1-(-1))^2}{2^2}+\dfrac{(x-2)^2}{2^2}=1$

which is simply a circle of radius = 2 centered at the point:

$(x_1, x_2)=(-1,2)$.



(b) Let's evaluate the center of circle:

$C(-1,2)=(1+(-1))^2+(2-(+2))^2=0<4$

And a point outside the circle, say $(0,6)$:

$C(0,6)=(1+0)^2+(2-6)^2=17>0$

Thus, the set of points for which $(1+x_1)^2+(2-x_2)^2>4$ are the set of pts strictly outside the circle

and the set where this is ≤ 4 is the set on or inside the circle.

(c) Classifier assigns to blue class if >4, to red class o.w.

Point	Eval	Assignment
$(0,0)$	$(1+0)^2+(2-0)^2=5>4$	blue
$(-1,1)$	$(1-1)^2+(2-1)^2=1\le 4$	red
$(2,2)$	$(1+2)^2+(2-2)^2=9>4$	blue
$(3,8)$	$(1+3)^2+(2-8)^2=52>4$	blue

(d.) We rewrite decision boundary in (c)

$(1+x_1)^2+(2-x_2)^2-4>0$

$1+2x_1+x_1^2+4-4x_2+x_2^2-4>0$

(★) $1+2x_1+x_1^2-4x_2+x_2^2>0$

(i) clearly not linear in x_1, x_2 since there are quadratic powers of each

(ii) However, (★) shows that I can write this as an expression that is linear in $\{x_1, x_1^2, x_2, x_2^2\}$