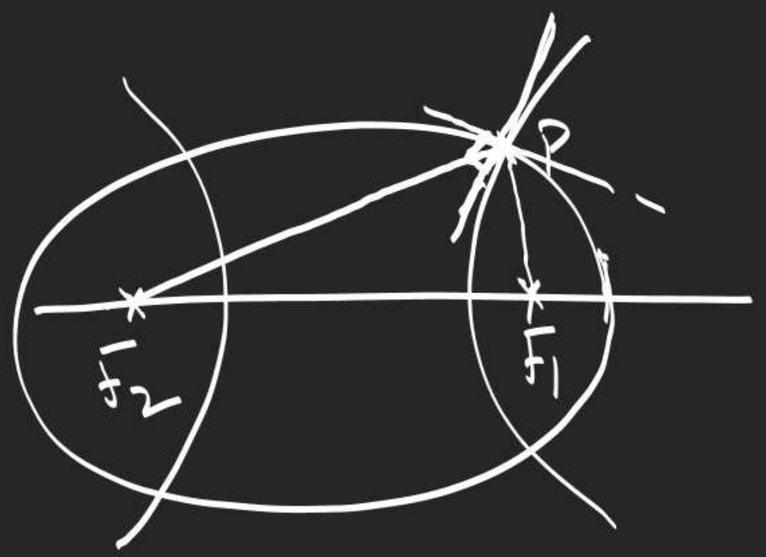
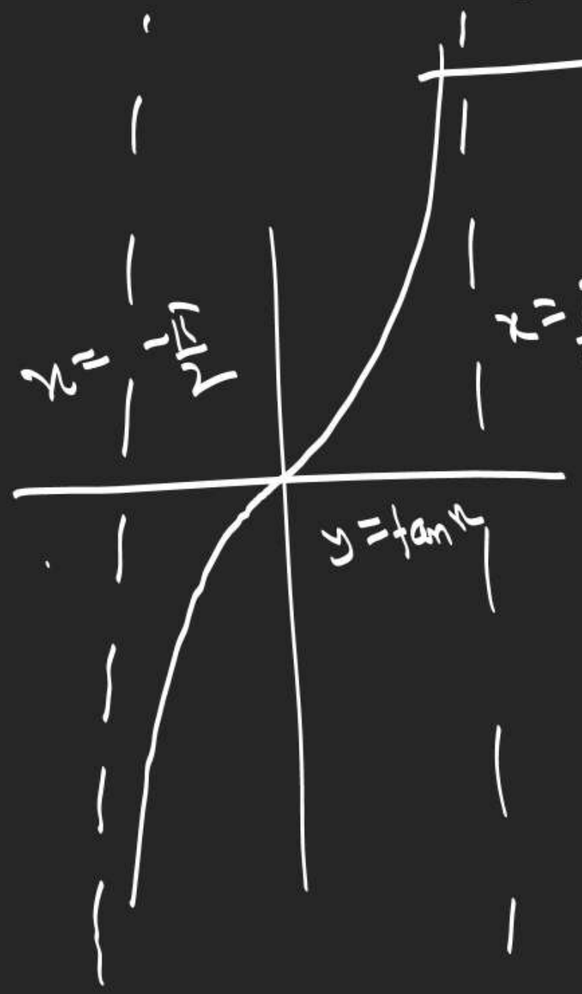
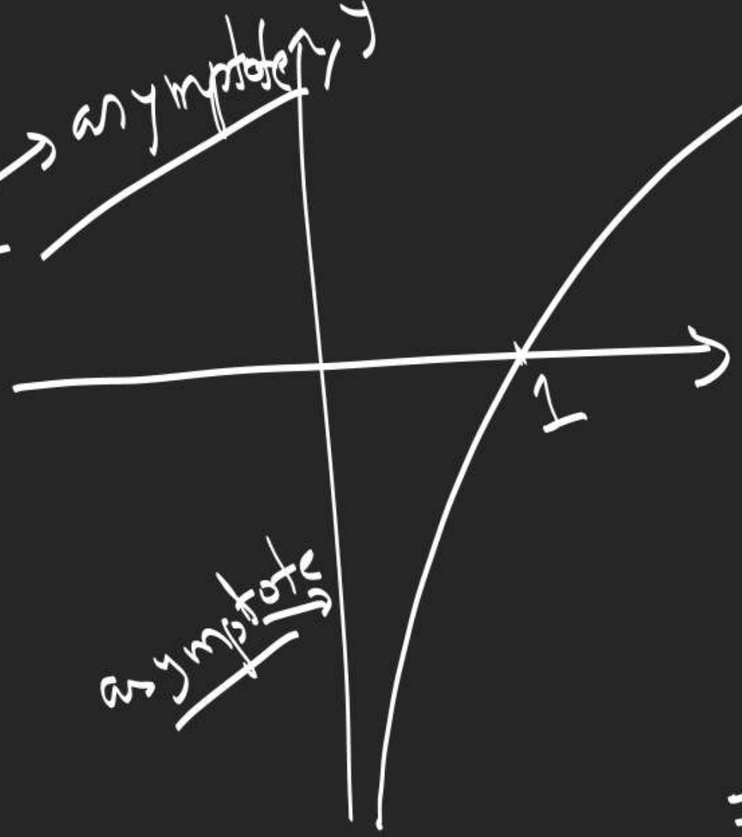
Nishant Jindal

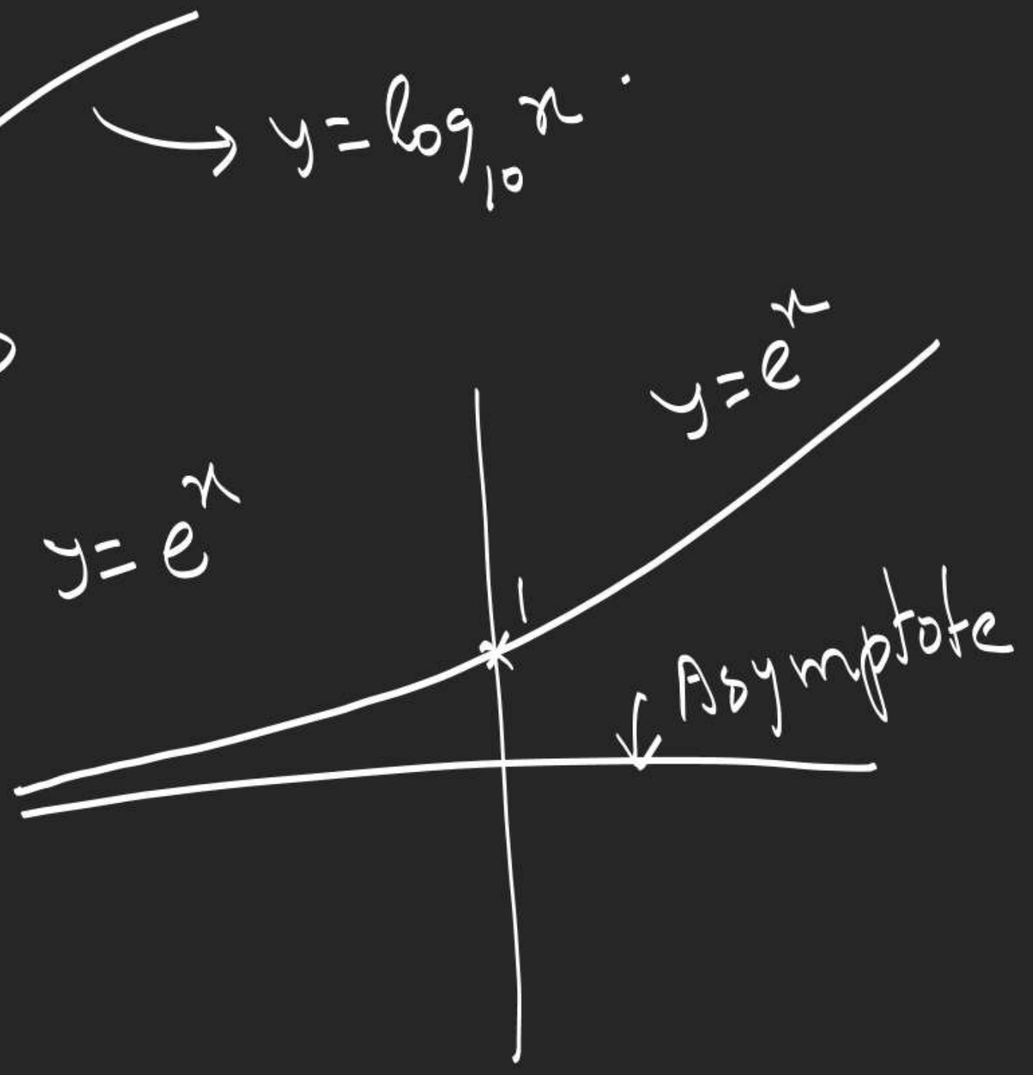


Nishant Jindal

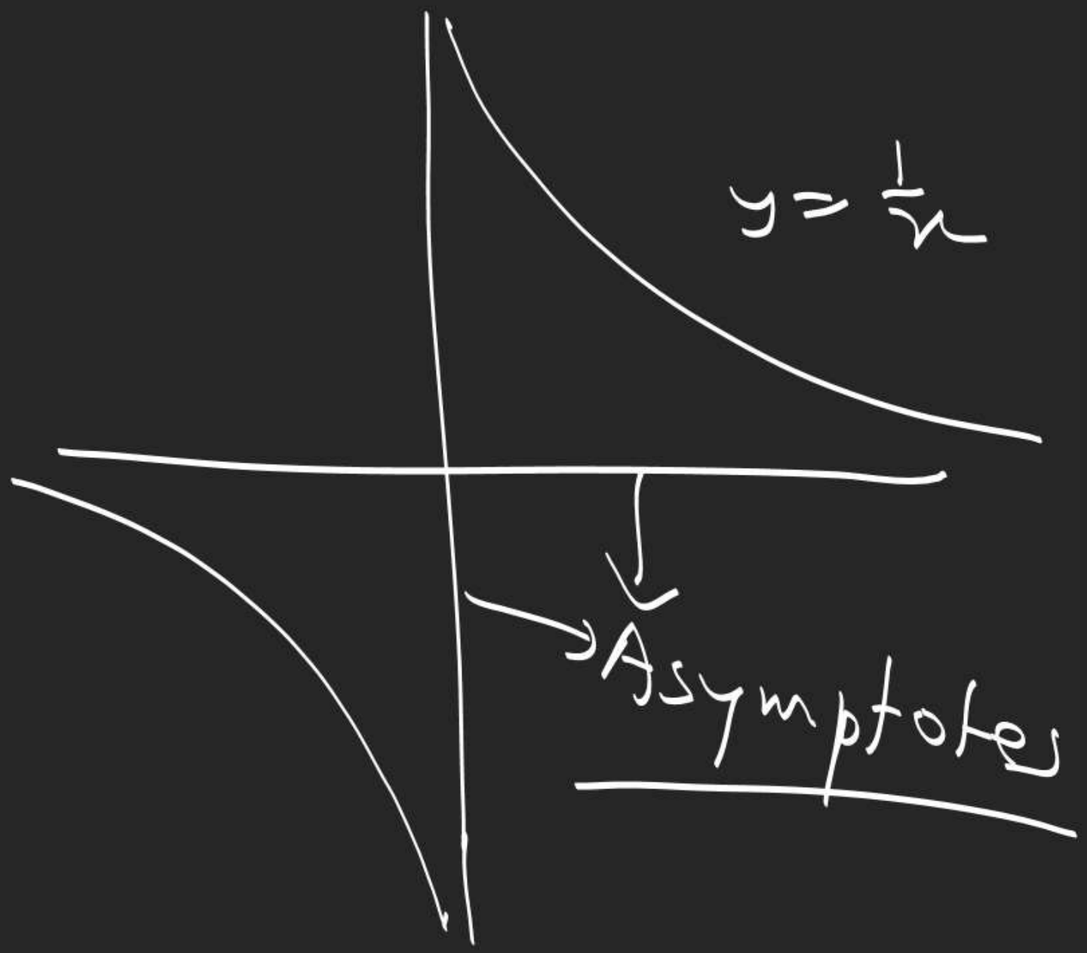
Asymptotes

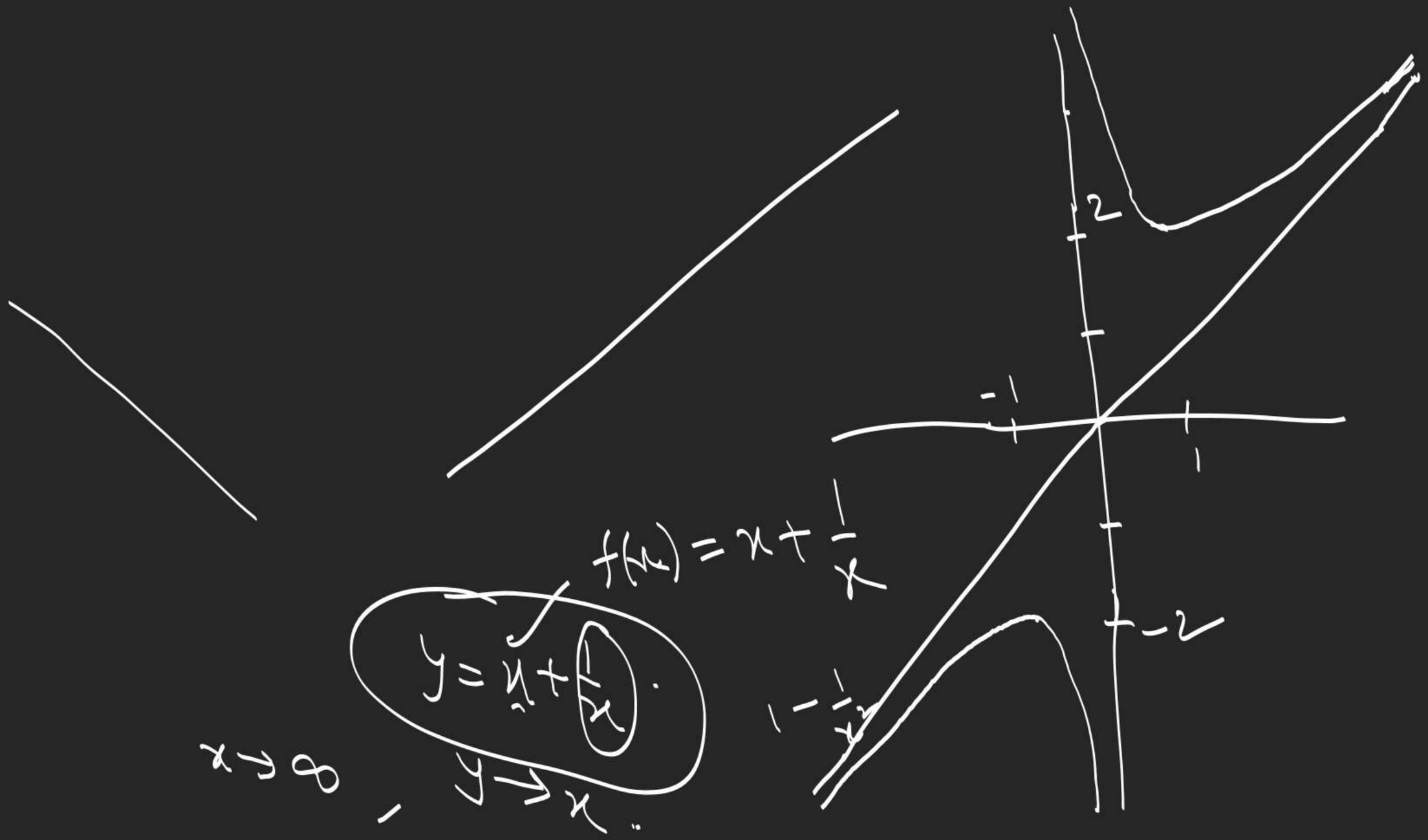




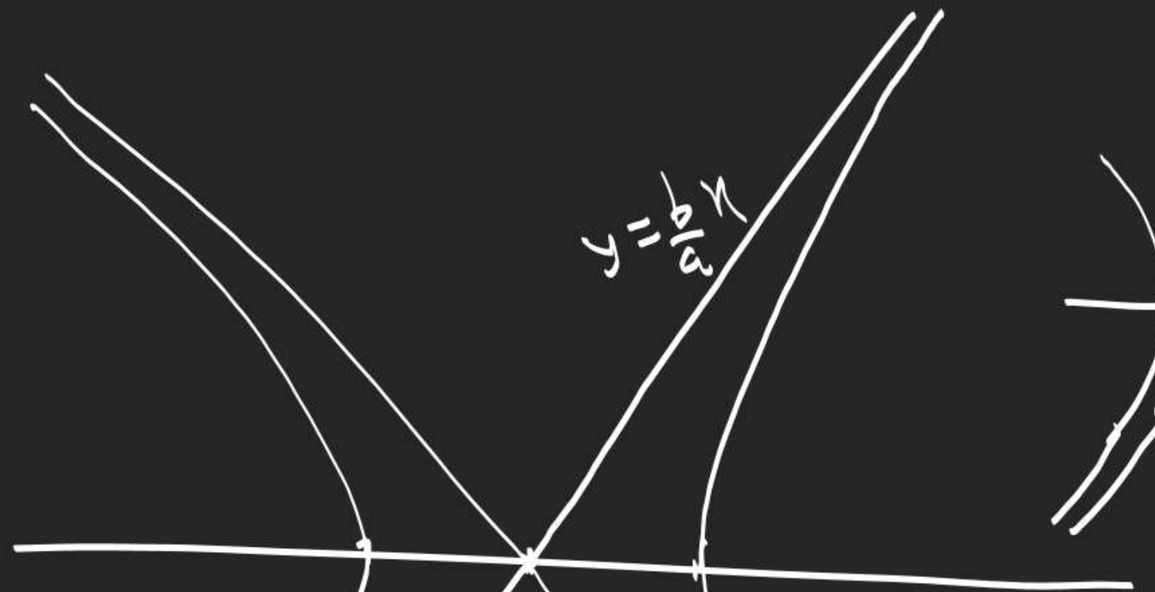


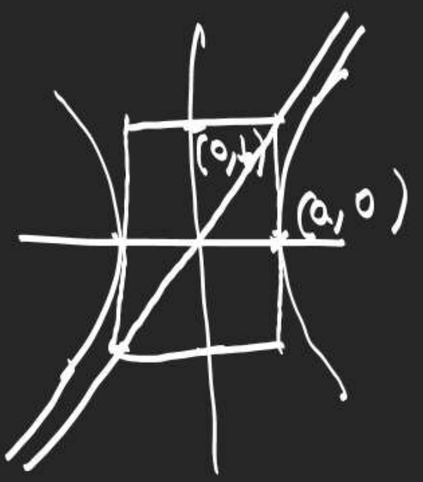
Nishant Jindal





Note →





$x \to \infty$,

$y^2 \to \frac{b^2x^2}{a^2} \Rightarrow \boxed{y \to \pm \frac{b}{a}x}$

$y^2 = b^2\left(\frac{x^2}{a^2} - 1\right)$

$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

$b^2x^2\left(\frac{1}{a^2} - \frac{1}{x^2}\right)$

Nishant Jindal

(3.)

$$\frac{x^2}{a^2}-\frac{y^2}{b^2}=1 \rightarrow H.$$

$$\frac{x^2}{a^2}-\frac{y^2}{b^2}=0 \rightarrow PA.$$

$$\frac{x^2}{a^2}-\frac{y^2}{b^2}=-1 \rightarrow CH$$

CA

$\alpha x+\beta y+\gamma = L_1$

$\alpha' x+\beta' y+\gamma' \rightarrow L_2$

$$1=\frac{L_1^2}{(\alpha^2+\beta^2)a^2}-\frac{L_2^2}{(\alpha'^2+\beta'^2)b^2}$$ → TA

H: $ax^2+2hxy+by^2+2gx+2fy+c=0$

PA: ——— " ——— $+c'=0$

CH: ——— " ——— $+c''=0$

$$\boxed{c+c''=2c'}$$

Nishant Jindal

$L_1 L_2 = 0$

Centre of Ellipse/Hyperbola.

$$f(x,y) = ax^2 + by^2 + 2hxy + 2gx + 2fy + c = 0$$

Intersection of L_1 & L_2:

$$\frac{\partial f}{\partial x} = 0 \Rightarrow 2ax + 2hy + 2g = 0$$

$$\frac{\partial f}{\partial y} = 0 \Rightarrow 2by + 2hx + 2f = 0$$

Intersection point = Centre.

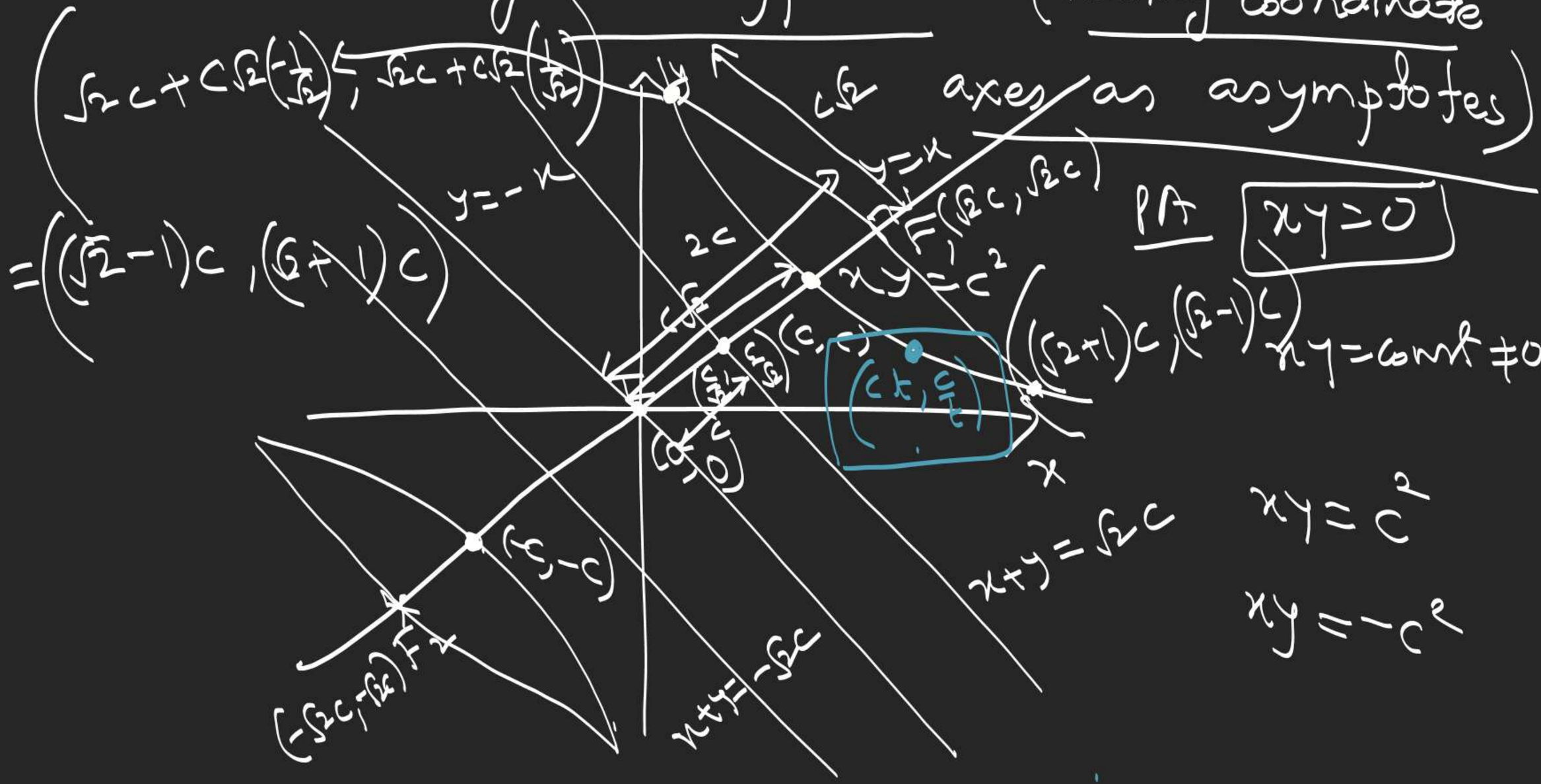
$$L_1 + \lambda L_2 = 0$$

$$L_1 + \mu L_2 = 0$$

$$\frac{L_1^2}{(\alpha^2+\beta^2)a^2} - \frac{L_2^2}{(\alpha'^2+\beta'^2)b^2} = 0 \Rightarrow \frac{2L_1\alpha}{(\alpha^2+\beta^2)b^2} - \frac{2L_2\alpha'}{b^2((\alpha')^2+\beta'^2)}$$

Nishant Jindal

Rectangular Hyperbola - (having coordinate axes as asymptotes)



Pt $\boxed{xy = 0}$

$xy = \text{const} \neq 0$

1. Find the eqn. to hyperbola whose asymptotes are liner $2x+3y+3=0$ and $3x+4y+5=0$ and which passes thru $(1,-1)$. Also write the eqn. of conjugate hyperbola and find center also.

2. A normal is drawn to hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ at P which meets the TA at G. If $\perp$ an from G on asymptote meets it at L. Show LP is parallel to CA.

3. Find the locus of orthocentre of ΔPQR. where P, Q, R lies on rectangular hyperbola.

4. If a circle and rectangular hyperbola $xy = c^2$ meet in 4 points $\left(ct_i, \frac{c}{t_i}\right)$, $i = 1, 2, 3, 4$, then

(a) P.T. mean position of 4 points bisects the distance b/n centres of two curves.

(b) P.T. centre of circle thro 3 points t_1, t_2, t_3 is $\left(\frac{c}{2}\left(t_1+t_2+t_3+\frac{1}{t_1t_2t_3}\right), \frac{c}{2}\left(\frac{1}{t_1}+\frac{1}{t_2}+\frac{1}{t_3}+t_1t_2t_3\right)\right)$