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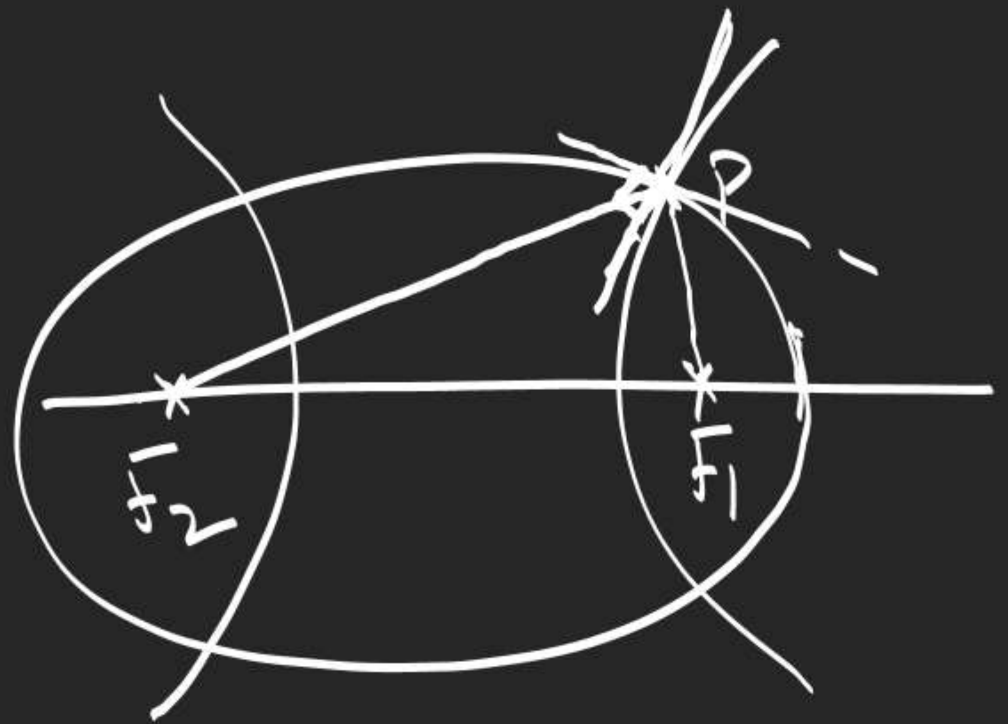

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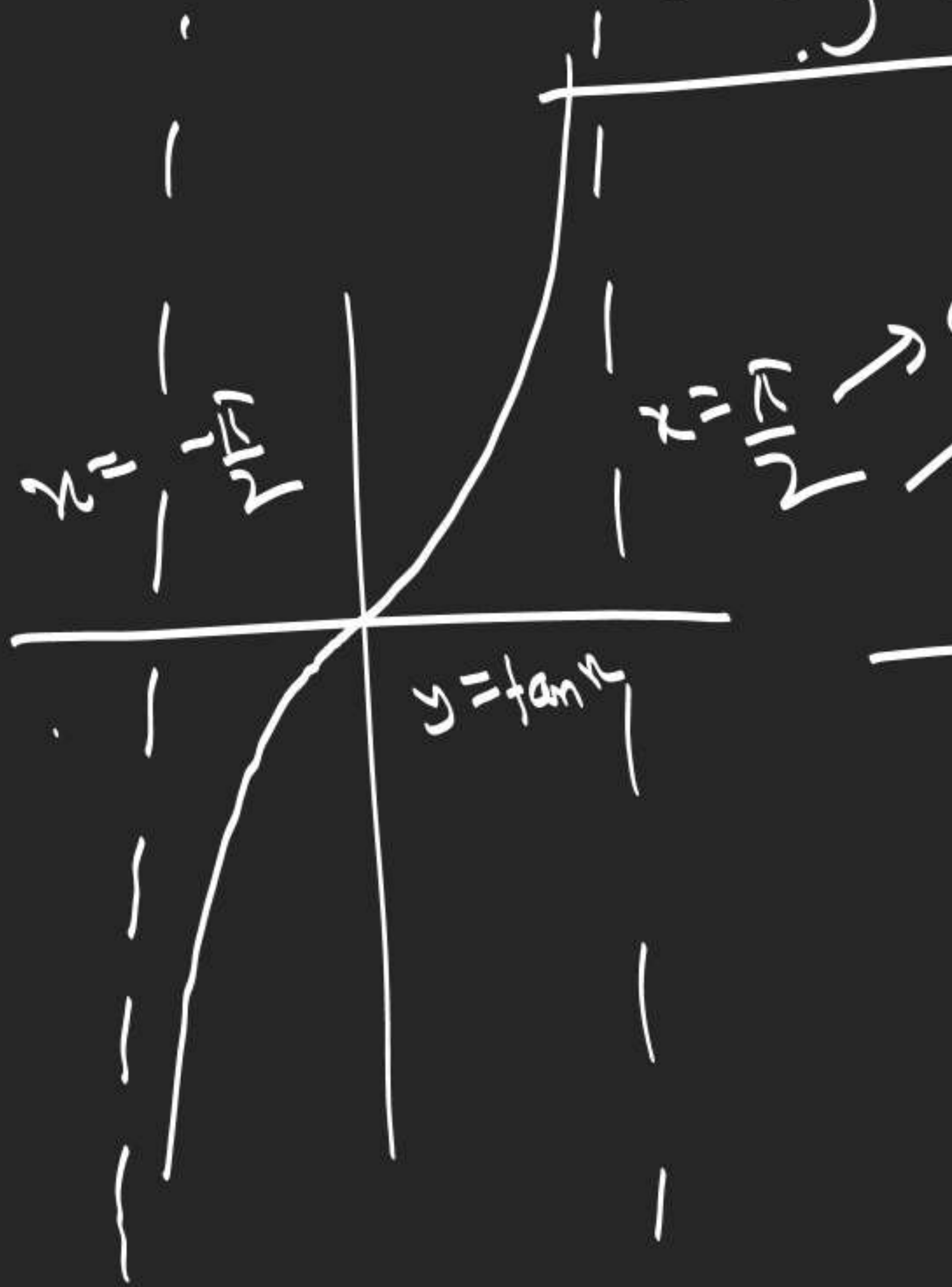
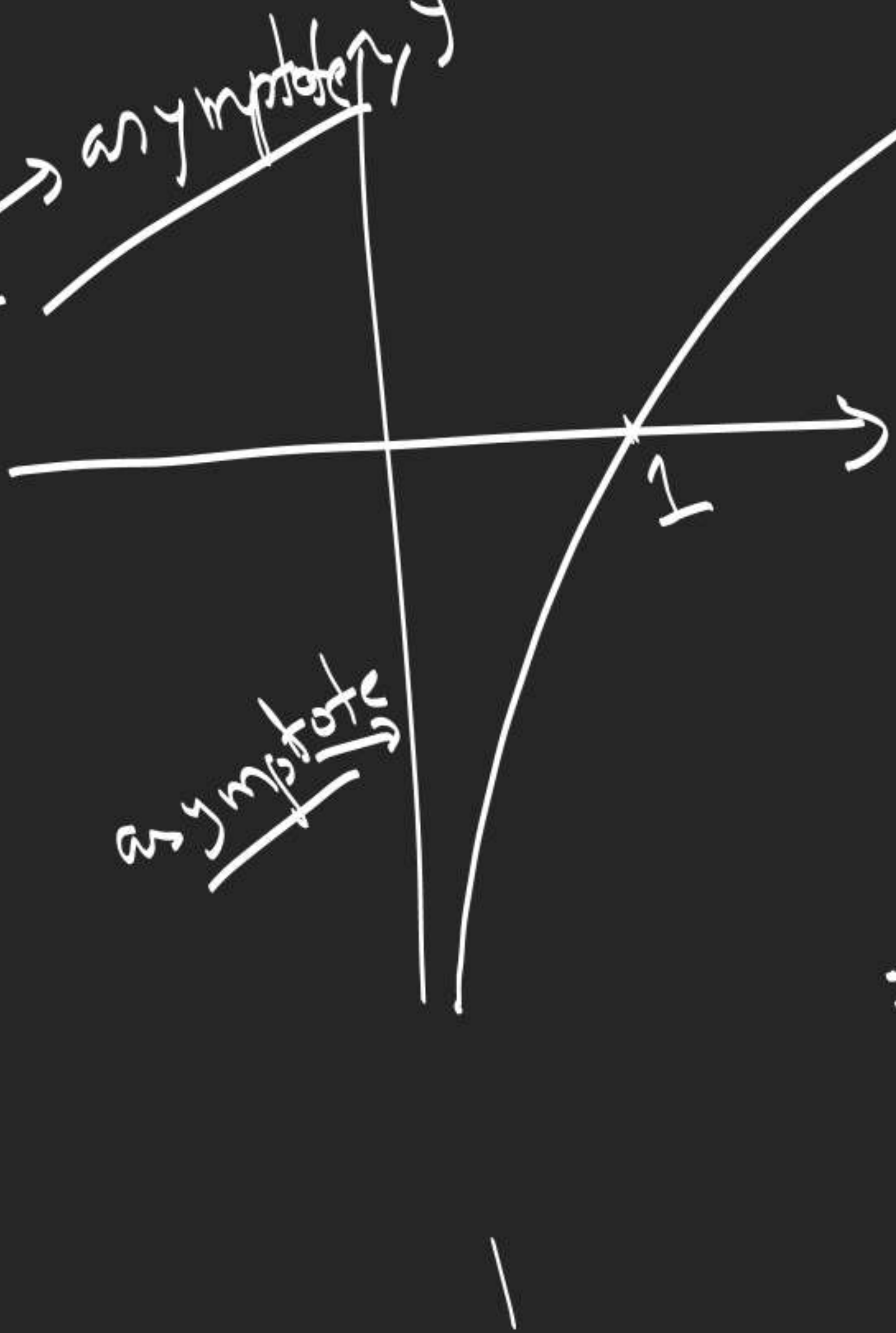
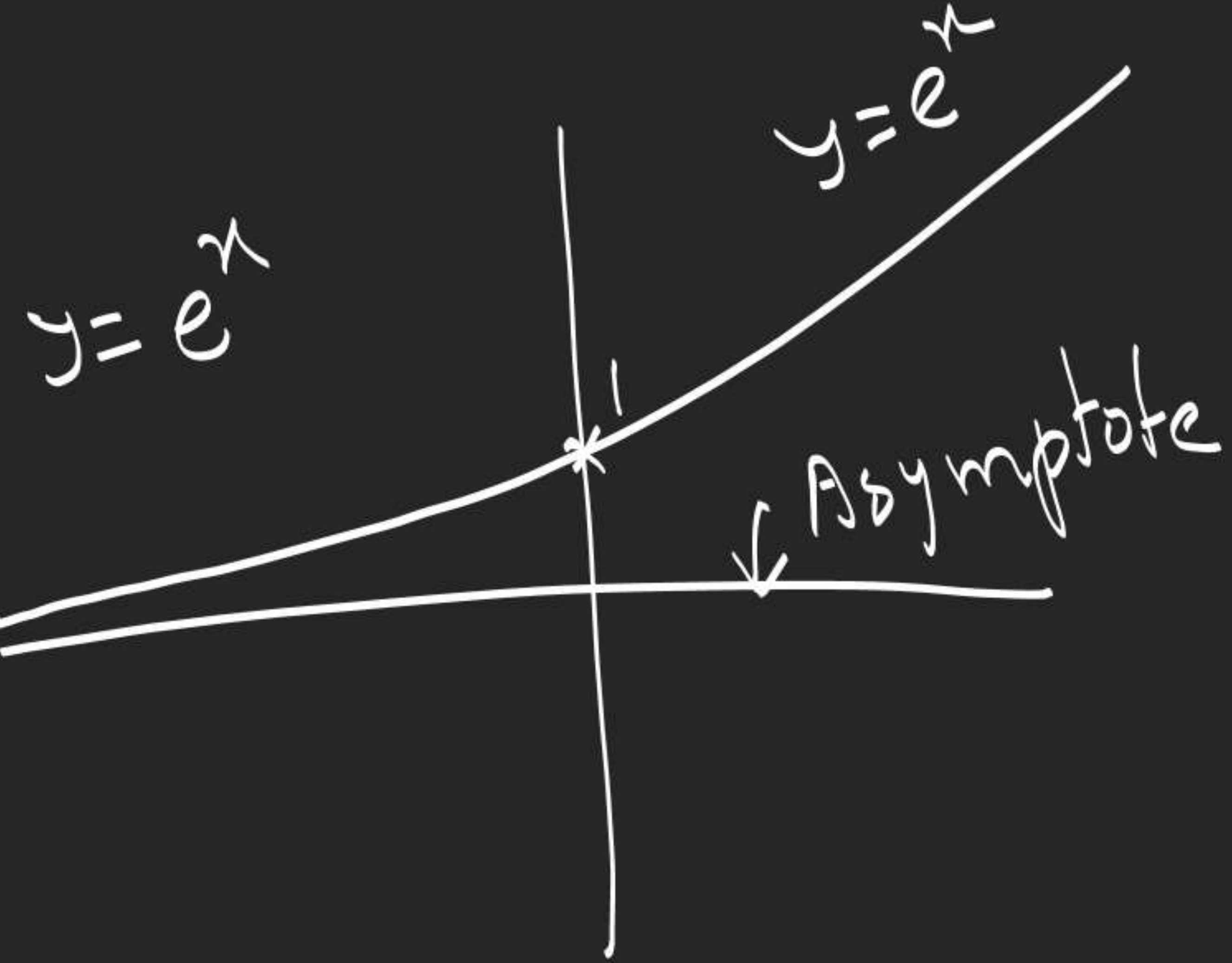
Asymptotes







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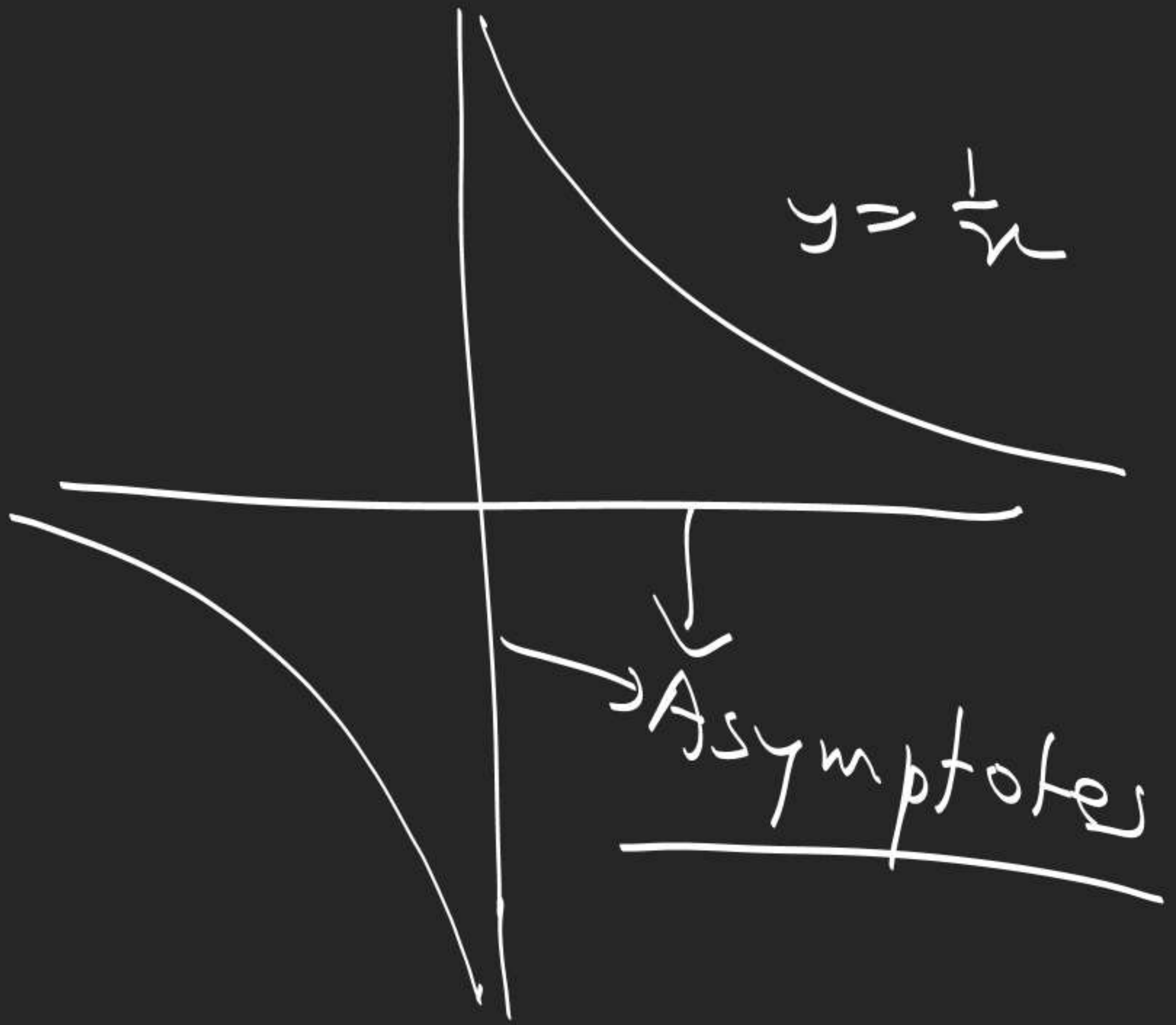
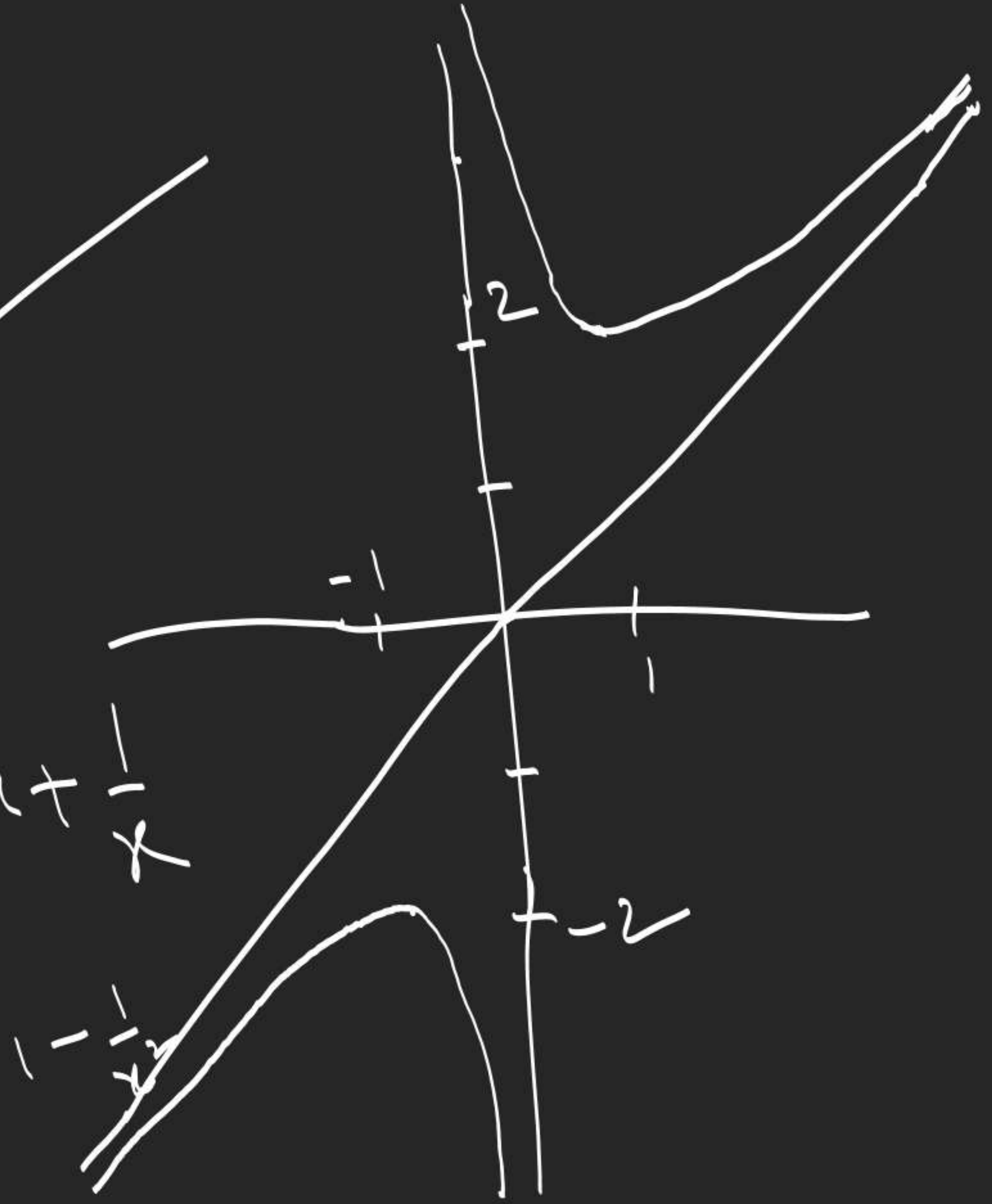


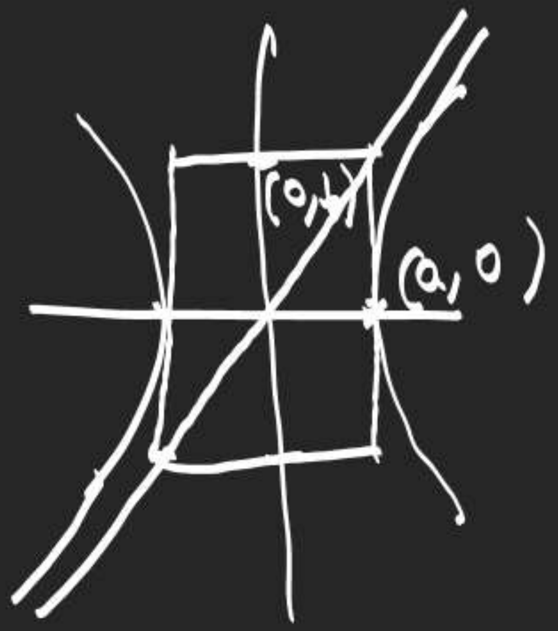
$$f(x) = x + \frac{1}{x}$$

$$y = x + \frac{1}{x}$$

$x \to \infty$, $y \to x$



Note →



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

$x \to \infty$, $\quad y^2 \to \dfrac{b^2x^2}{a^2} \Rightarrow \boxed{y \to \pm \dfrac{b}{a}x}$

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

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(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

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

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

TA

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

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

PA: ——— " ——————— $+c'=0$

CH: ——— " ——————— $+c''=0$

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

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$\boxed{L_1 L_2 = 0}$ 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.

$$L_1 + \lambda L_2 = 0$$

$$L_1 + \mu L_2 = 0$$

$$\frac{L_1^2}{(\alpha^2+\beta^2)a^2} - \frac{L_2^2}{(\alpha'^2+\beta'^2)b^2} = 1 \Rightarrow \frac{2L_1\alpha}{(\alpha^2+\beta^2)b^2} - \frac{2L_2\alpha'}{b^2((\alpha')^2+\beta'^2)} = 0$$

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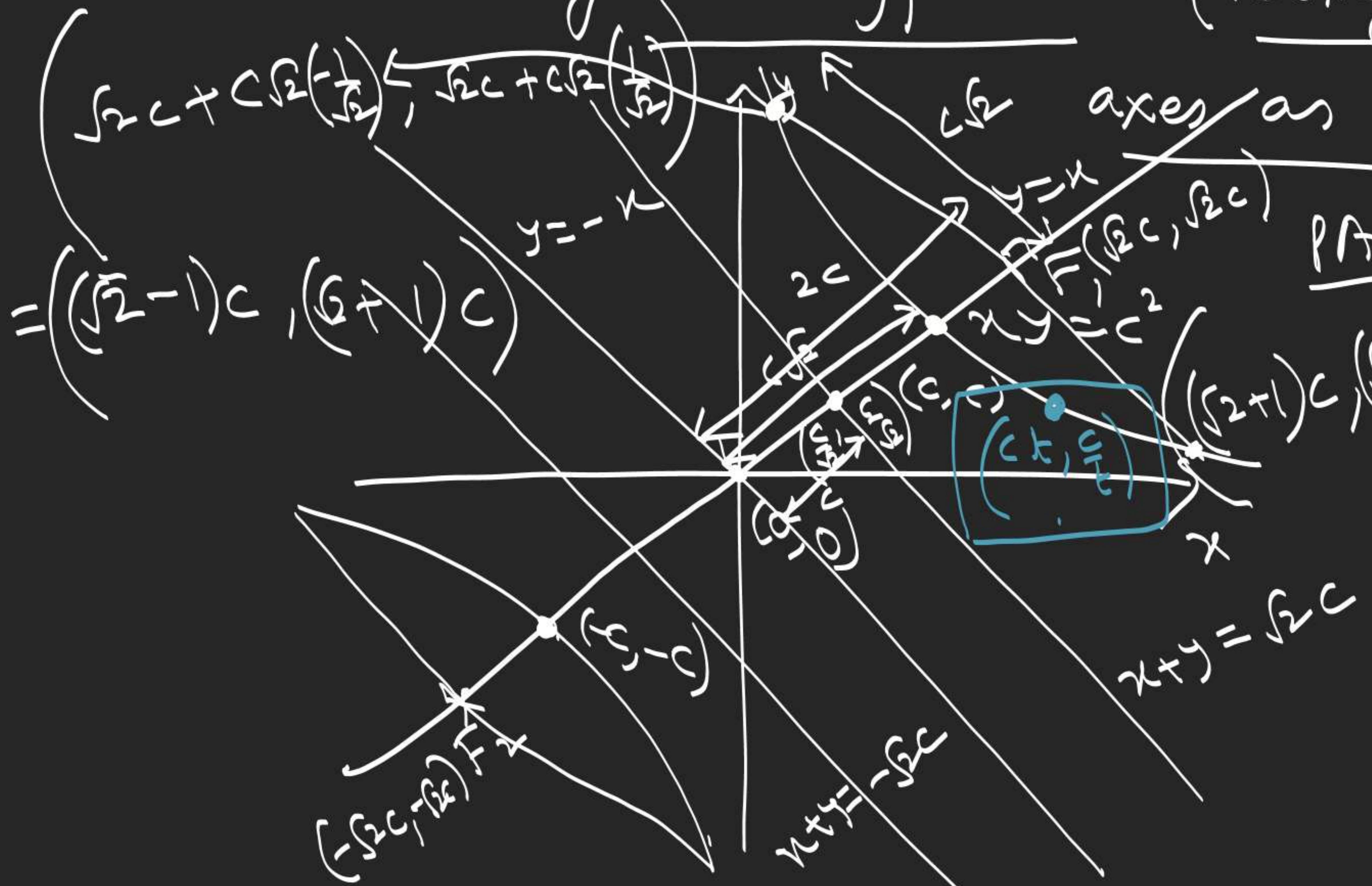
Rectangular Hyperbola -(having coordinate axes as asymptotes)



PA $\boxed{xy = 0}$

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

$xy = c^2$

$xy = -c^2$

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1. Find the eqn. to hyperbola whose asymptotes are lines $2x+3y+3=0$ 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 $\perp$ar from G on asymptote meets it at L. Show LP is parallel to CA.

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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 thru 3 points t_1, t_2, t_3 is $\left(\frac{c}{2}\left(t_1 + t_2 + t_3 + \frac{1}{t_1 t_2 t_3}\right), \frac{c}{2}\left(\frac{1}{t_1} + \frac{1}{t_2} + \frac{1}{t_3} + t_1 t_2 t_3\right)\right)$