

①, ③

$$a^2 = 1 + \frac{b^2}{\frac{25}{4}}$$

$$4 = \frac{\frac{25}{4} + b^2}{\frac{25}{4}}$$

$$25 = \frac{25}{4} + 4b^2$$

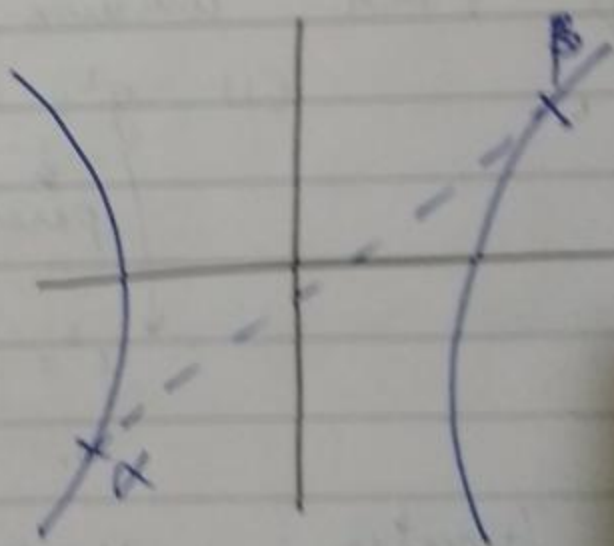
$$\frac{25}{4} = 4b^2$$

Eqⁿ of hyperbola

$$\rightarrow \frac{(x-1)^2}{\frac{25}{4}} - \frac{(y-4)^2}{\frac{25}{4}}$$

EQN OF CHORD AT PT. α AND β

$$\frac{x}{a} \cos\left(\frac{\alpha - \beta}{2}\right) - \frac{y}{b} \sin\left(\frac{\alpha + \beta}{2}\right) = \cos\left(\frac{\alpha + \beta}{2}\right)$$



IF CHORD PASSES THROUGH FOCUS.

$$e \cos\left(\frac{\alpha - \beta}{2}\right) = \cos\left(\frac{\alpha + \beta}{2}\right)$$

$$e = \frac{\cos\left(\frac{\alpha + \beta}{2}\right)}{\cos\left(\frac{\alpha - \beta}{2}\right)}$$

So, eq of tangents can be,

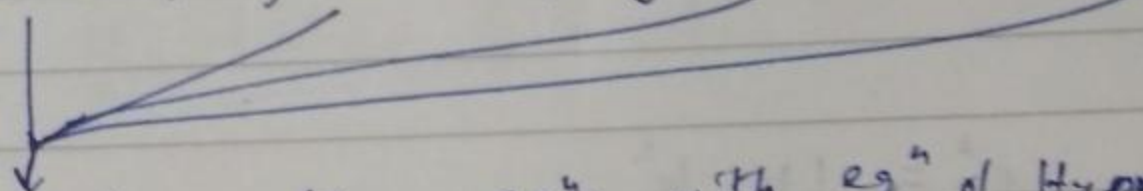
$$y = mx \pm \sqrt{a^2 m^2 - b^2}$$

$$\Rightarrow y = x \pm \sqrt{3} \rightarrow y = x \pm 1$$

$$\Rightarrow y = -x \pm \sqrt{3} \rightarrow y = -x \pm 1$$

we're getting 4 solutions,

$$y = x + 1, y = x - 1, y = -x + 1, y = -x - 1$$



~~Ans.~~ Solving these eqⁿs with eqⁿ of Hyperbola, we'll find that, are these all real tangents

(i) $D \neq 0$

$$(ii) \quad 3x^2 - 4(x+1)^2 = 12$$

$$D = 0$$

find for all cases

CHORD OF CONTACT

$$T = 0$$

EQN. OF CHORD (MID-POINT FORM)

$$T = S_1$$

COMBINED EQ OF TANGENTS

$$T = SS_1$$

EQ. OF RECTANGULAR HYPERBOLA

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

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

$$x^2 - y^2 = a^2$$

TANGENT

$$\sqrt{a^2 m^2 - b^2} \quad \text{where } a^2 m^2 - b^2 \geq 0$$

as it is under root,

$$a^2 m^2 - b^2 \geq 0$$

$$(am - b)(am + b) \geq 0$$

$$\left(m - \frac{b}{a}\right)\left(m + \frac{b}{a}\right) \geq 0$$

$$m \in \left(-\infty, -\frac{b}{a}\right] \cup \left[\frac{b}{a}, \infty\right)$$

TANGENT (POINT FORM)

POINT FORM

$$T=0$$

$$\boxed{\frac{xx_1}{a^2} - \frac{yy_1}{b^2} = 1}$$

$$\frac{x_1^2}{a^2} - \frac{y_1^2}{b^2} = 1$$

PARAMETRIC FORM