Nishant Jindal

Hai Live class.

Parametric Eqⁿ

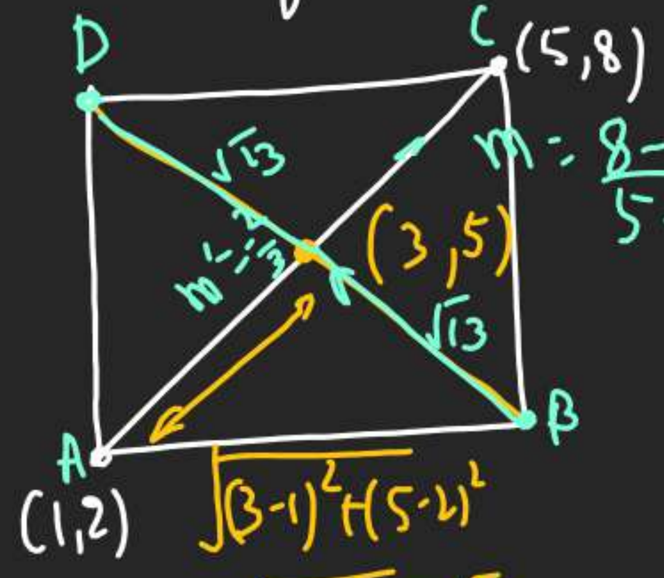
(1) Line → for θ

(2) Pt. on Line → fix pt (x_1, y_1)

(3) ask about a pt which is at r dist. from (x_1, y_1)

New pt = $(x_1 + r\cos\theta,\ y_1 + r\sin\theta)$

Q If 2 vertices of a diagonal are (1,2) & (5,8) of a Sqr. find Rest of the vertices?



$\sqrt{(3-1)^2 + (5-2)^2}$

$= \sqrt{4+9} = \sqrt{13}$

$m = \frac{8-2}{5-1} = \frac{6}{4} = \frac{3}{2}$

(1) B is a pt. at −ve √13 dist. from (3,5) & D is at +ve √13 dist. from (3,5)

(2) K is dir. निकालना है। θ क्या निकला?

here $\tan\theta = -\frac{2}{3}$

$\cos\theta = -\frac{3}{\sqrt{13}}$, $\sin\theta = \frac{+2}{\sqrt{13}}$

as $\tan\theta = -ve$

2nd Quad

⇒ $\cos\theta = -ve$ & $\sin\theta = +ve$

$D = \left(3 + \sqrt{13} \times -\frac{3}{\sqrt{13}},\ 5 + \sqrt{13} \times \frac{2}{\sqrt{13}}\right)$

$= (0, 7)$

$B = \left(3 - \sqrt{13} \times -\frac{3}{\sqrt{13}},\ 5 - \sqrt{13} \times \frac{2}{\sqrt{13}}\right)$

$= (6, 3)$

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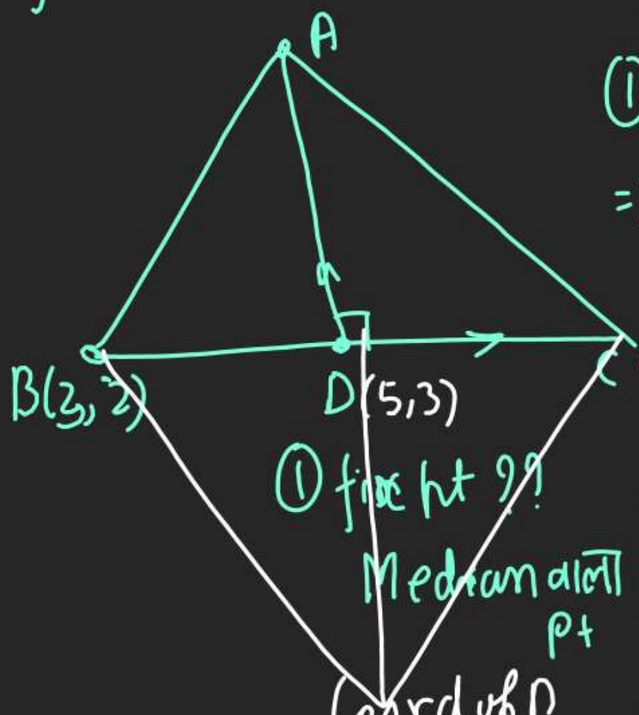
① If A, B, C are vertices of eq^l $\triangle$. find A as shown in diag.



① Concept to Use
⇒ In eq^l $\triangle$ median = altitude.

① find pt ??
Median ka mid pt
Coord of D
$= \left(\frac{7+3}{2}, \frac{4+2}{2}\right)$
$= (5, 3)$

② How much distance to travel??

$a \sin 60°$

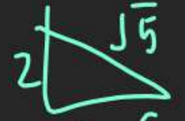
$a = \sqrt{4^2 + 2^2}$
$= 2\sqrt{5}$

$\frac{\sqrt{3}}{2} a = \frac{\sqrt{3}}{2} \times 2\sqrt{5} = \sqrt{15}$

③ θ Kitna hoga??

$m = \frac{4-2}{7-3} = \frac{2}{4} = \frac{1}{2}$

$\therefore m' = -2 = \tan\theta$



$\cos\theta = -\frac{1}{\sqrt{5}}$, $\sin\theta = \frac{2}{\sqrt{5}}$

$A = \left(5 + \sqrt{15} \times -\frac{1}{\sqrt{15}}, 3 + \sqrt{15} \times \frac{2}{\sqrt{15}}\right) = (5-\sqrt{3}, 3+2\sqrt{3})$

$= \left(5 - \sqrt{15} \times -\frac{1}{\sqrt{15}}, 3 - \sqrt{15} \times \frac{2}{\sqrt{15}}\right) = (5+\sqrt{3}, 3-2\sqrt{3})$

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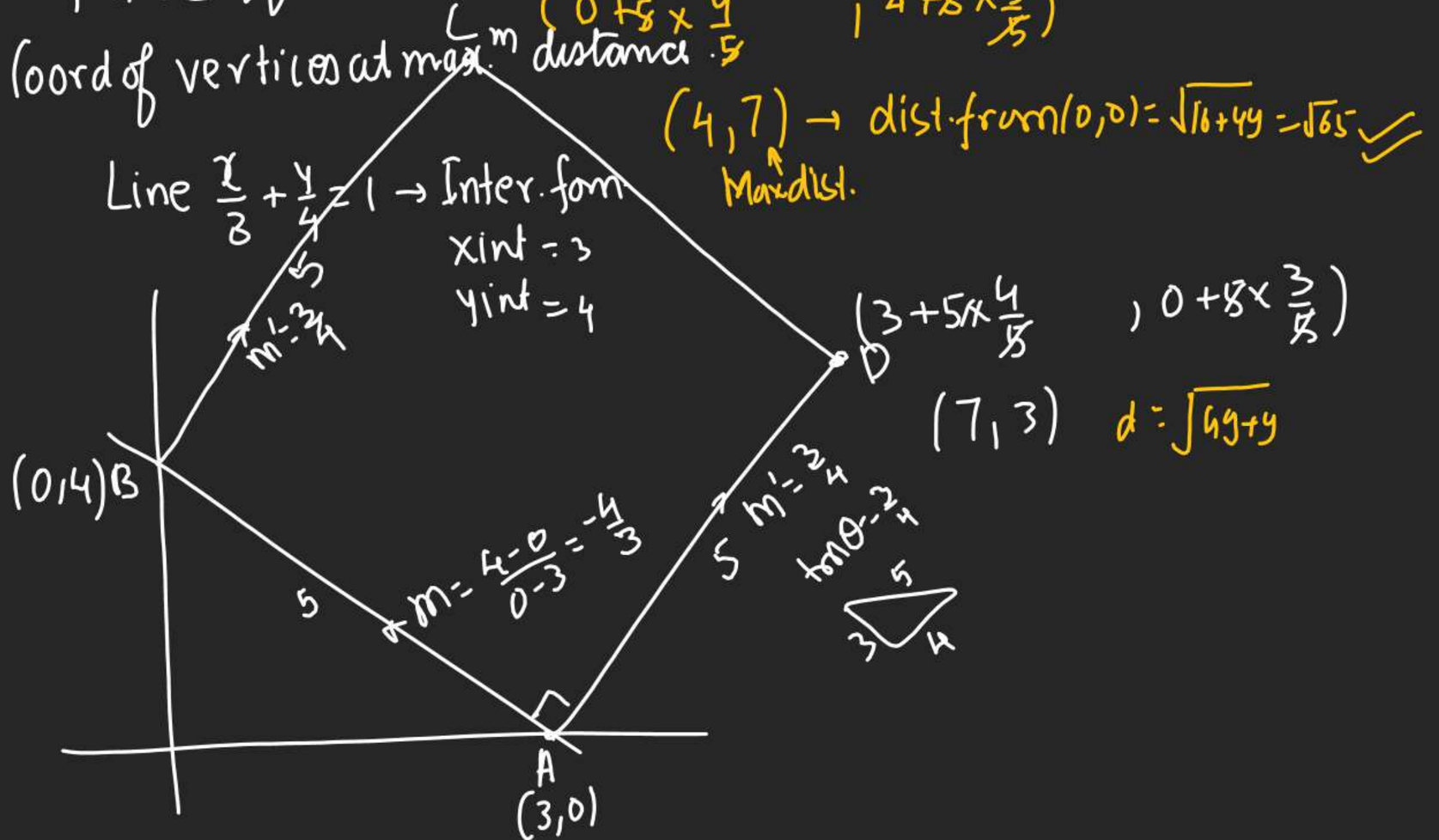
Q If a Line $\frac{x}{3}+\frac{y}{4}=1$ Intersect x Axis at A & y Axis B. If AB is one side of sqr then coord of vertices at max. distance from (0,0)



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Q A line through the pt. A(−5, −4) meets the line $L_1: x+3y+2=0$

$L_2: 2x+y+4=0$, $L_3: x-y-5=0$

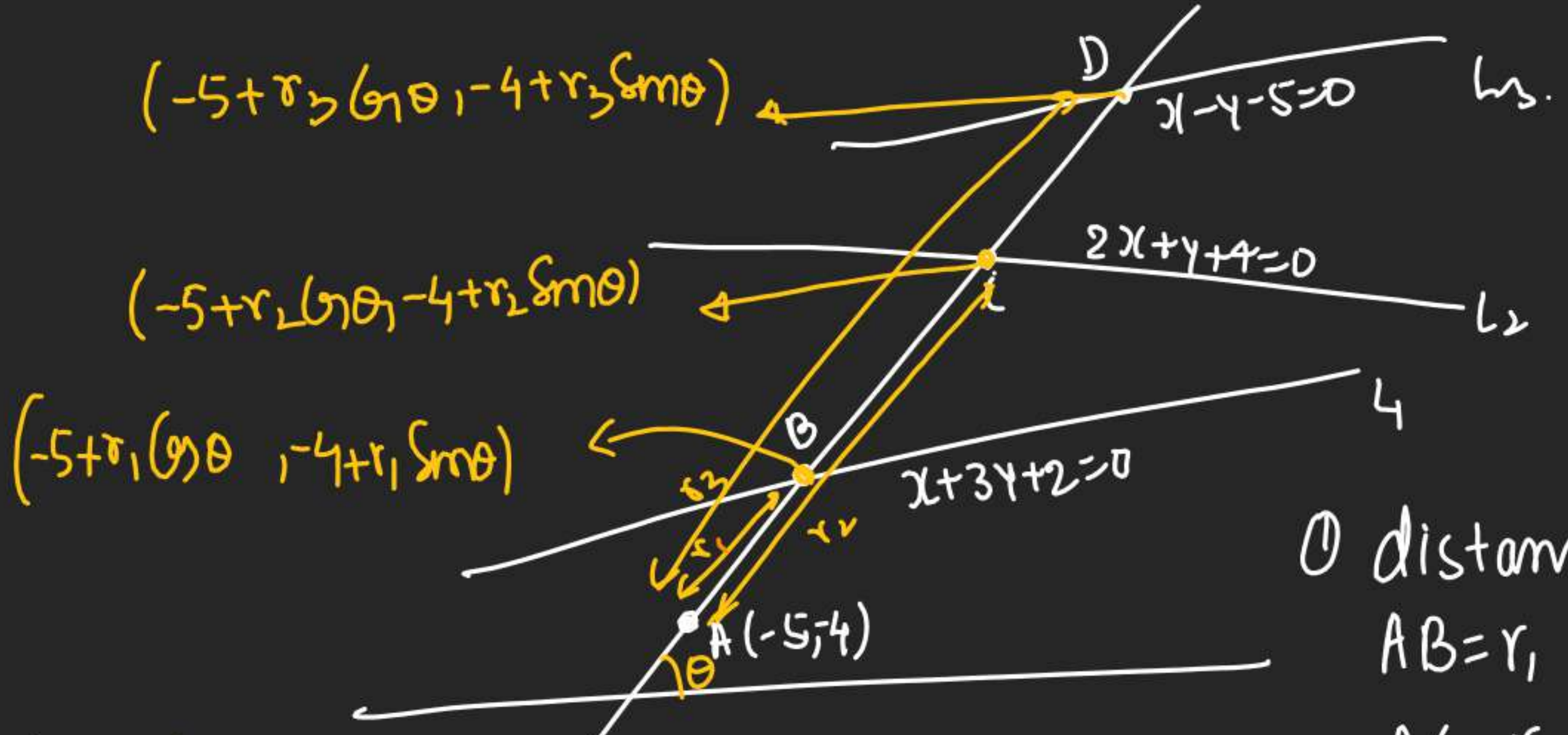
at B, C, D Respectively

If $\left(\frac{15}{AB}\right)^2+\left(\frac{10}{AC}\right)^2=\left(\frac{6}{AD}\right)^2$ find

EOL.

2-Point Pt(−5, −4)

m = ?



⓪ distance

$AB = r_1$

$AC = r_2$

$AD = r_3$

① B lies on $x+3y+2=0$

$(-5+r_1\cos\theta)+3(-4+r_1\sin\theta)+2=0$

$r_1\cos\theta+3r_1\sin\theta=15 \Rightarrow \cos\theta+3\sin\theta=\frac{15}{r_1}=\frac{15}{AB}$

② C lies on $2x+y+4=0$

$2(-5+r_2\cos\theta)+(-4+r_2\sin\theta)+4=0$

$2r_2\cos\theta+r_2\sin\theta=10 \Rightarrow 2\cos\theta+\sin\theta=\frac{10}{r_2}=\frac{10}{AC}$

(3) D lies on $x-y-5=0 \Rightarrow (-5+r_3\cos\theta)-(-4+r_3\sin\theta)=5$

$\cos\theta-\sin\theta=\frac{6}{r_3}=\frac{6}{AD}$

④ $\left(\frac{15}{AB}\right)^2+\left(\frac{10}{AC}\right)^2=\left(\frac{6}{AD}\right)^2$

$\Rightarrow (C+3S)^2+(2C+S)^2=(C-S)^2$

$5C^2+10S^2+10SC=C^2+S^2-2SC$

$4C^2+9C^2+12SC=0$

$(2C+3S)^2=0$

$2C+3S=0$

$2\cos\theta+3\sin\theta=0$

$3\sin\theta=-2\cos\theta$

$m=\tan\theta=-\frac{2}{3}$

$\therefore (y+4)=-\frac{2}{3}(x+5)$ Ans

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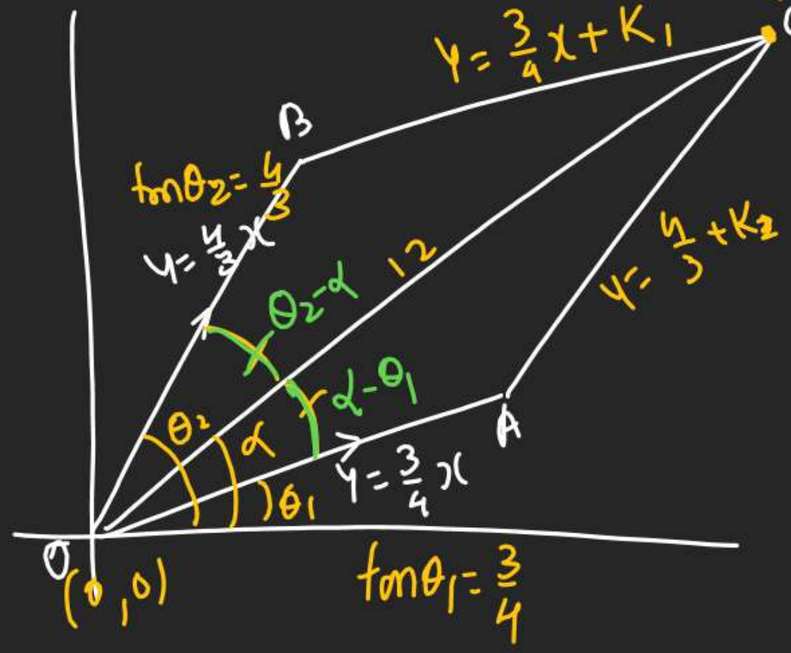
Q 2 Sides of a Rhombus lies in 1st Quad are given by $L_1: y = \frac{3}{4}x$, $L_2: y = \frac{4}{3}x$

If length of longer diagonal $OC = 12$ find the eqn of other sides.



1) Demand BC & AC की eqn.

$y = \frac{3}{4}x + K_1$ $\quad$ $y = \frac{4}{3}x + K_2$

K_1, K_2 निकालने पड़ेंगे If C Aa Jaye!!

(3) $C \equiv (0+12\cos 45°, 0+12\sin 45°) = (6\sqrt{2}, 6\sqrt{2})$

4) $6\sqrt{2} = \frac{3}{4}\cdot 6\sqrt{2} + K_1 \Rightarrow K_1 = 6\sqrt{2} - \frac{9}{\sqrt{2}} = \frac{3}{\sqrt{2}}$ $\therefore$ BC → $\boxed{y = \frac{3}{4}x + \frac{3}{\sqrt{2}}}$

2) $\alpha - \theta_1 = \theta_2 - \alpha$

$2\alpha = \theta_1 + \theta_2$

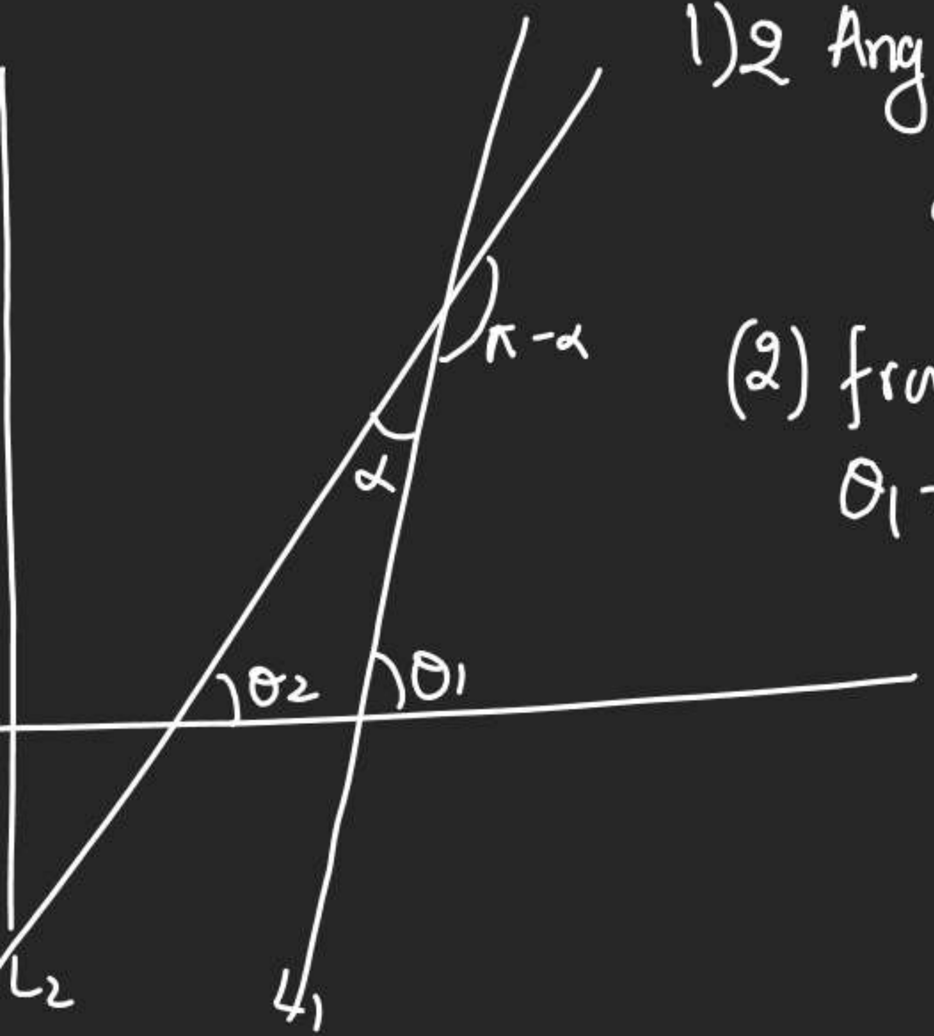
$\tan(2\alpha) = \tan(\theta_1 + \theta_2)$

$= \frac{\tan\theta_1 + \tan\theta_2}{1 - \tan\theta_1 \cdot \tan\theta_2}$

$\tan 2\alpha = \frac{\frac{3}{4} + \frac{4}{3}}{1 - \frac{3}{4}\times\frac{4}{3}} = \infty$

$2\alpha = \frac{\pi}{2} \Rightarrow \alpha = 45°$

Angle betⁿ 2 lines



1) 2 Angles Possible betⁿ 2 Lines → α, $\pi-\alpha$.

(2) from diagram

θ_1 = Exterior Angle = Sum of 2 Int. Angle.

$$\theta_1 = \theta_2 + \alpha.$$

$$\alpha = \theta_1 - \theta_2$$

$$\tan\alpha = \tan(\theta_1 - \theta_2)$$

$$\tan\alpha = \frac{\tan\theta_1 - \tan\theta_1}{1 + \tan\theta_1 \cdot \tan\theta_2}$$

$$\tan\alpha = \frac{m_1 - m_2}{1 + m_1 m_2}$$

(3) for convinience. We take acute angle

$$\boxed{\tan\alpha = \left|\frac{m_1 - m_2}{1 + m_1 m_2}\right|}$$

We take Modulus.

(4) Rk :- 1) If $m_1 = m_2$ (lines are $\parallel^{el}$ or Coincident)

$$\tan\alpha = 0 \Rightarrow \alpha = 0$$

(2) If $L_1 \perp L_2 \Rightarrow \alpha = \frac{\pi}{2}$

$$\tan\alpha = \left|\frac{m_1 - m_2}{1 + m_1 m_2}\right| = \frac{1}{0}$$

$$1 + m_1 m_2 = 0 \Rightarrow \boxed{m_1 m_2 = -1}$$

(3) If $m_1 m_2 = 1 \Rightarrow m_1 = \frac{1}{m_2}$

$$\tan\theta_1 = \cot\theta_2$$

$$\Rightarrow \theta_1 = \frac{\pi}{2} - \theta_2 \Rightarrow \boxed{\theta_1 + \theta_2 = \frac{\pi}{2}}$$

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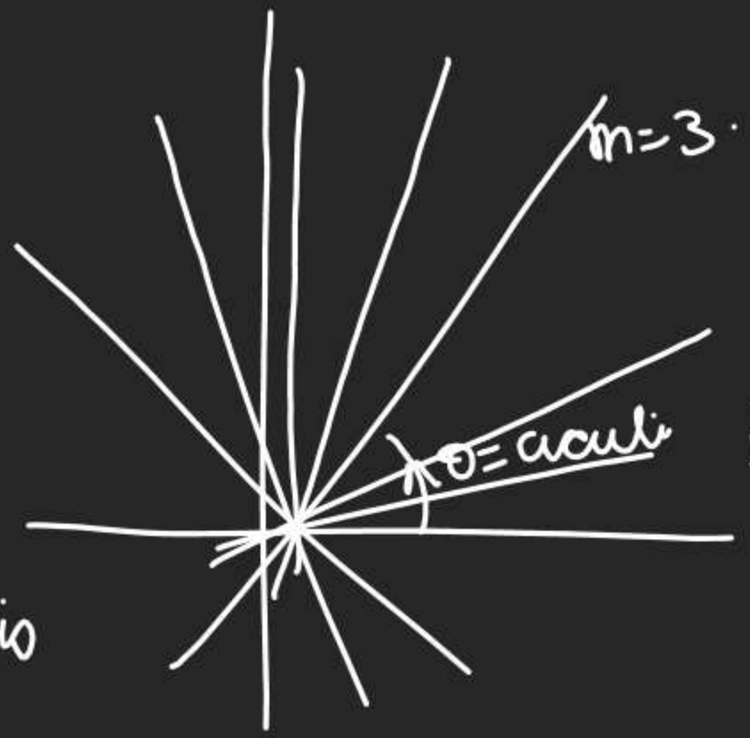
Rem:- If $m_1 m_2 = -1$ then $L_1 \perp L_2$ But if $l_1 \perp L_2$ it is not necessary that every time $m_1 m_2 = -1$



$\tan\theta = 3.$

HW →

11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 38, 51, 52, 53, 55, 56, 57, 68, 72

Q Line $3x - ay - 1 = 0$ is $\parallel^{r}$ to Line $(a+2)x - y + 3 = 0$ then a.

$m_1 = m_2 \iff (Sl)_{L_1} = (SL)_{L_2}$

$$\frac{3}{a} = \frac{a+2}{1}$$

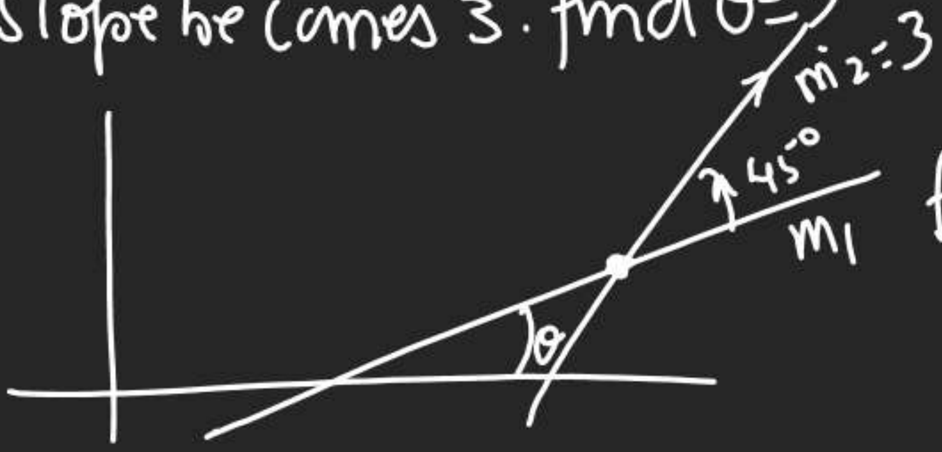
$$3 = a^2 + 2a$$

$$a^2 + 2a - 3 = 0$$

$$(a+3)(a-1) = 0$$

$$a = 1 \text{ or } -3$$

Q Angle of the Line with +ve dir. of x Axis is θ (acute). If Line is Rotated about some pt. on it in ACW direction at 45° then its slope becomes 3. find θ = ?



अगर Mod use नहीं कर रहे then take care of Bigger Slope

$$\tan 45° = \frac{3 - m_1}{1 + 3m_1} = 1$$

$$1 + 3m_1 = 3 - m_1$$

$$4m_1 = 2 \Rightarrow m_1 = \frac{1}{2} \quad \tan\theta = \frac{1}{2}$$

$$\theta = \tan^{-1}\left(\frac{1}{2}\right) \ *$$