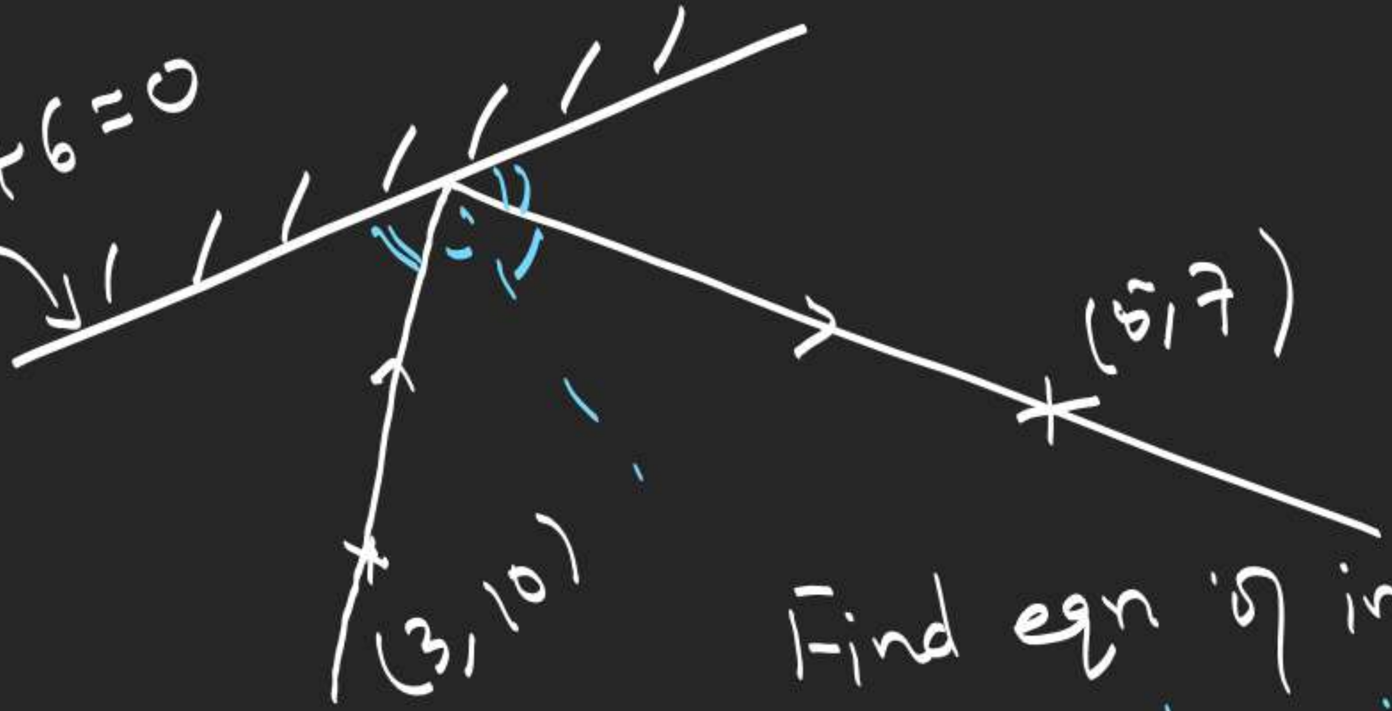
Nishant Jindal

1.

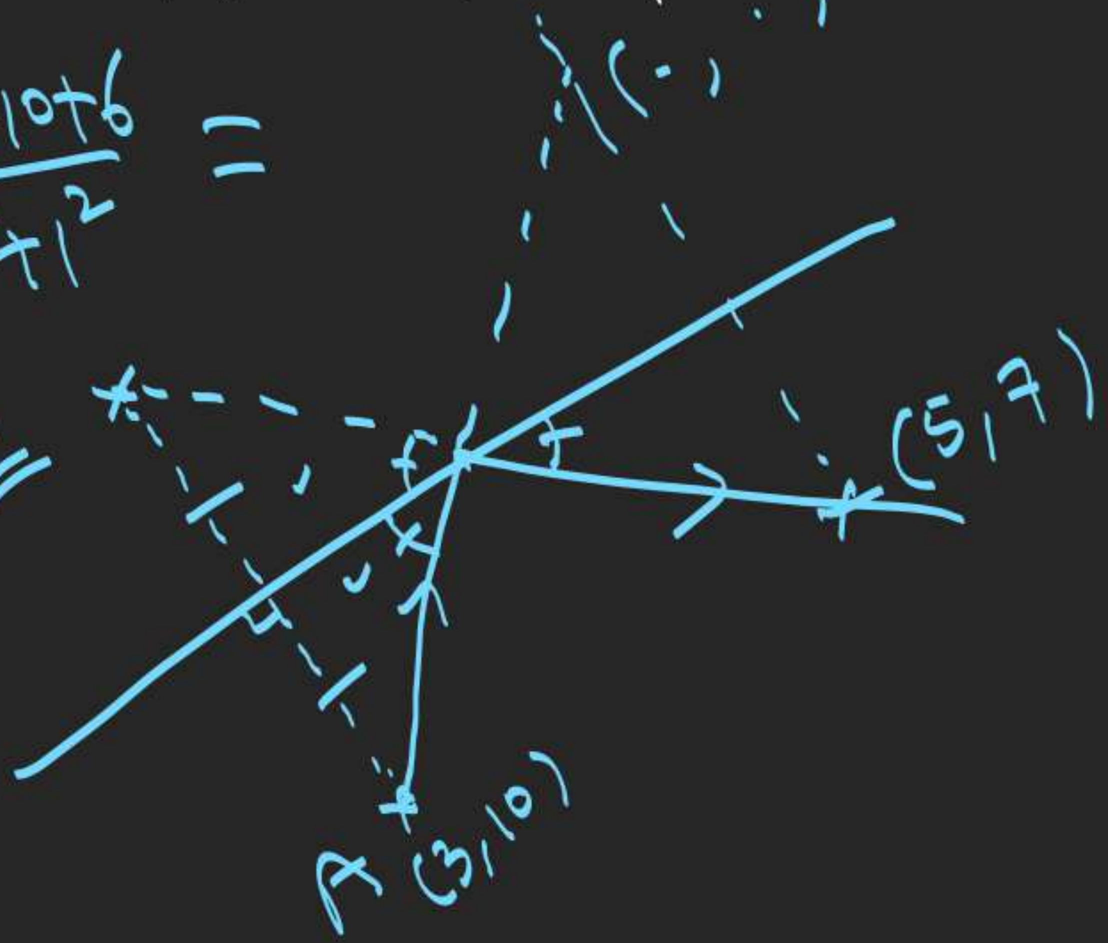


Find eqn of incident & reflected rays.

A'

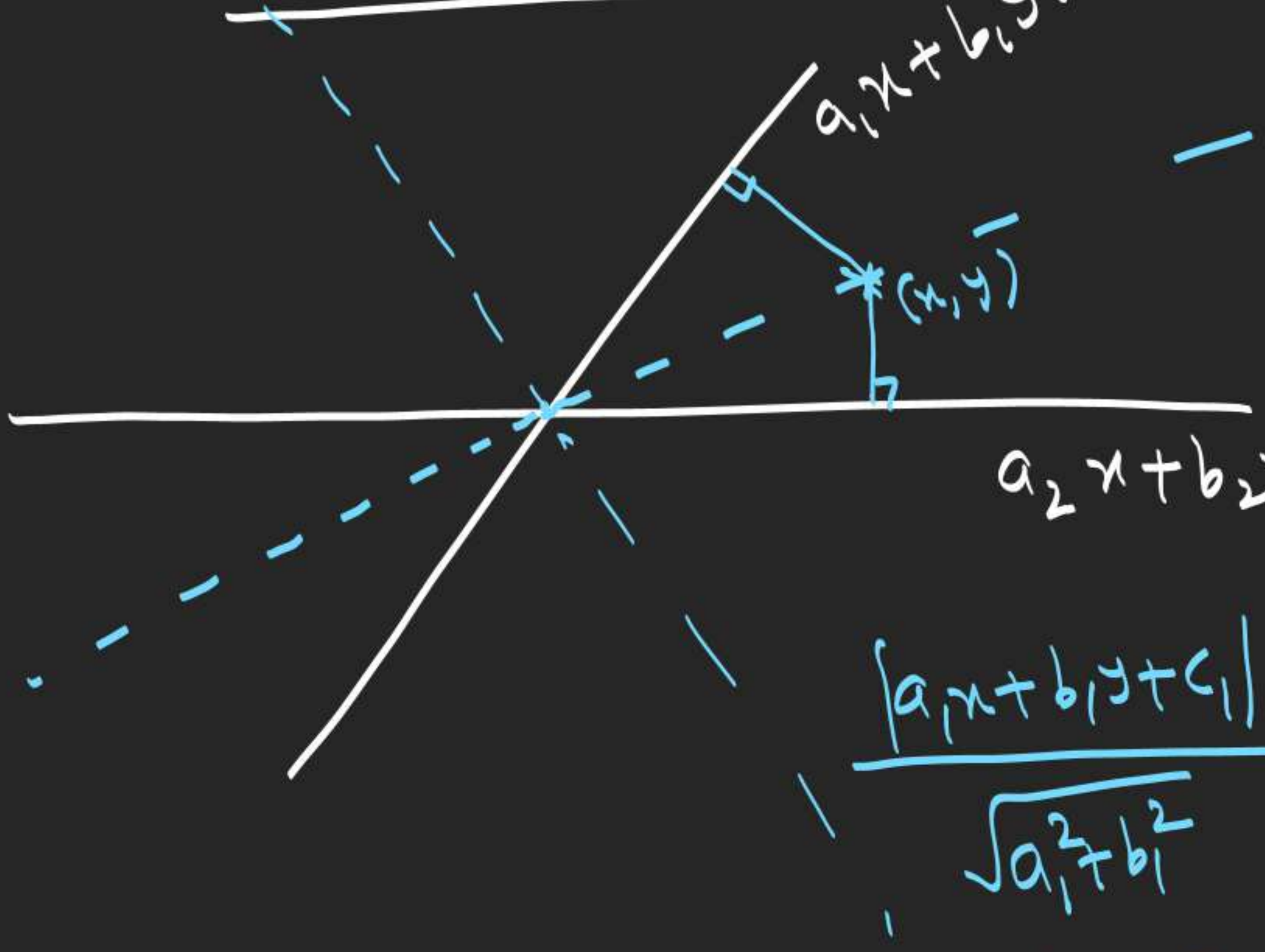
$$\frac{x-3}{2}=\frac{y-10}{1}=-2\,\frac{6+10+6}{2^2+1^2}=$$

$A'=(\ ,\ )$



Angle bisector

$a_1x+b_1y+c_1=0$



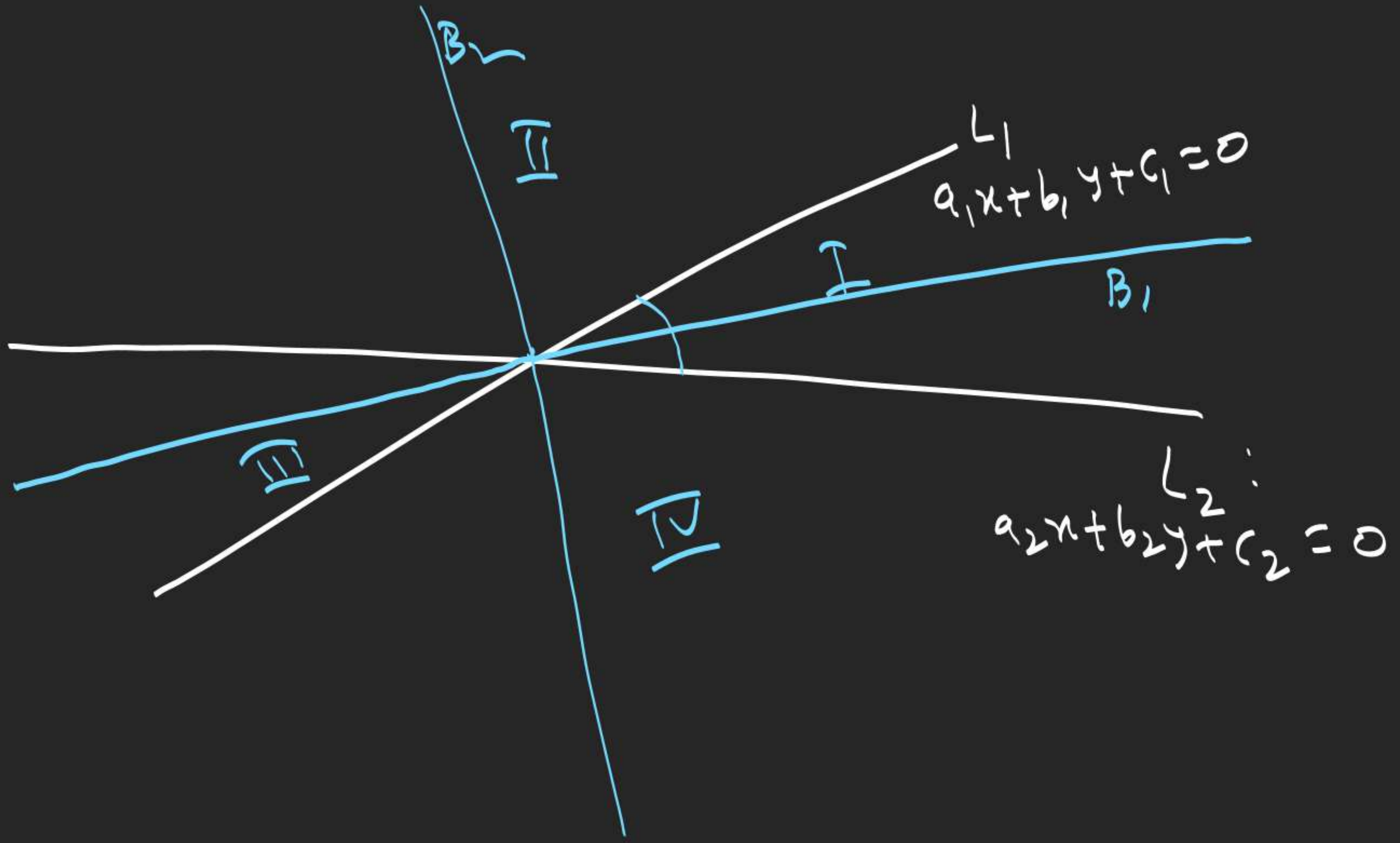
$a_2x+b_2y+c_2=0$

$$\boxed{\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = \pm\frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}}$$

$$\frac{|a_1x+b_1y+c_1|}{\sqrt{a_1^2+b_1^2}} = \frac{|a_2x+b_2y+c_2|}{\sqrt{a_2^2+b_2^2}}$$

$$\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = -\left(\frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}\right) \;\&\; \frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = \frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}$$

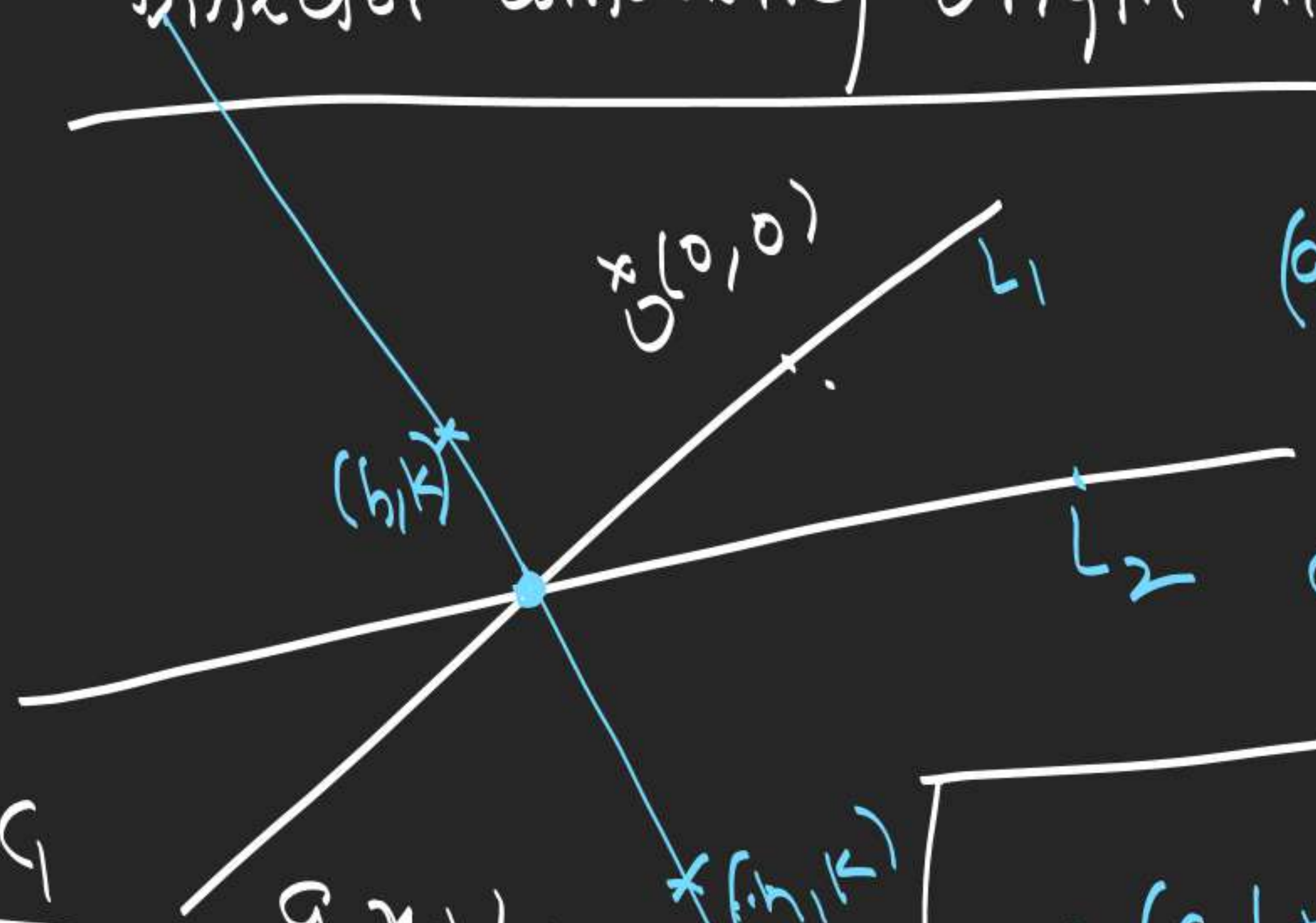
Nishant Jindal



Nishant Jindal

Bisector Containing Origin in its region

$c_1 c_2 \neq 0$



$(a_1h+b_1k+c_1)c_1 > 0$ & $c_2(a_2h+b_2k+c_2) > 0$

OR

$c_1(a_1h+b_1k+c_1) < 0$ & $c_2(a_2h+b_2k+c_2) < 0$

$$\boxed{\underbrace{c_1c_2}(a_1h+b_1k+c_1)(a_2h+b_2k+c_2) \geq 0}$$

$$\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = \frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}, \quad c_1c_2>0$$

Point (h,k) lying on bisector containing $(0,0)$ in its region satisfy

$$\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = -\left(\frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}\right) \to c_1c_2<0$$

Nishant Jindal

$$2x+3y-7=0 \quad , \quad x-2y+3=0$$

$$-2x-3y+7=0 \quad , \quad x-2y+3=0$$

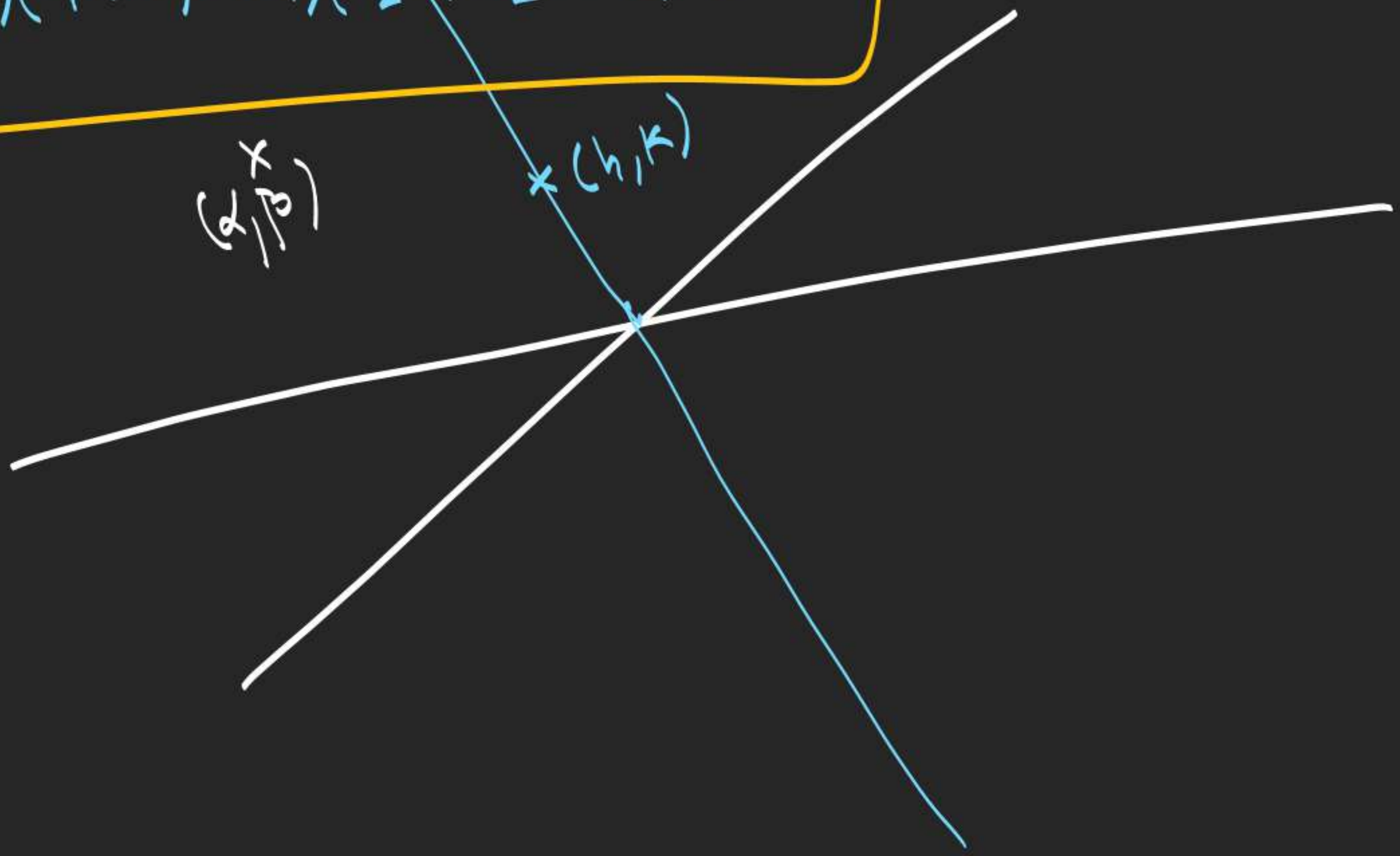
$$\frac{-2x-3y+7}{\sqrt{13}} = \frac{x-2y+3}{\sqrt{5}}$$

$$\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = \frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}$$

Nishant Jindal

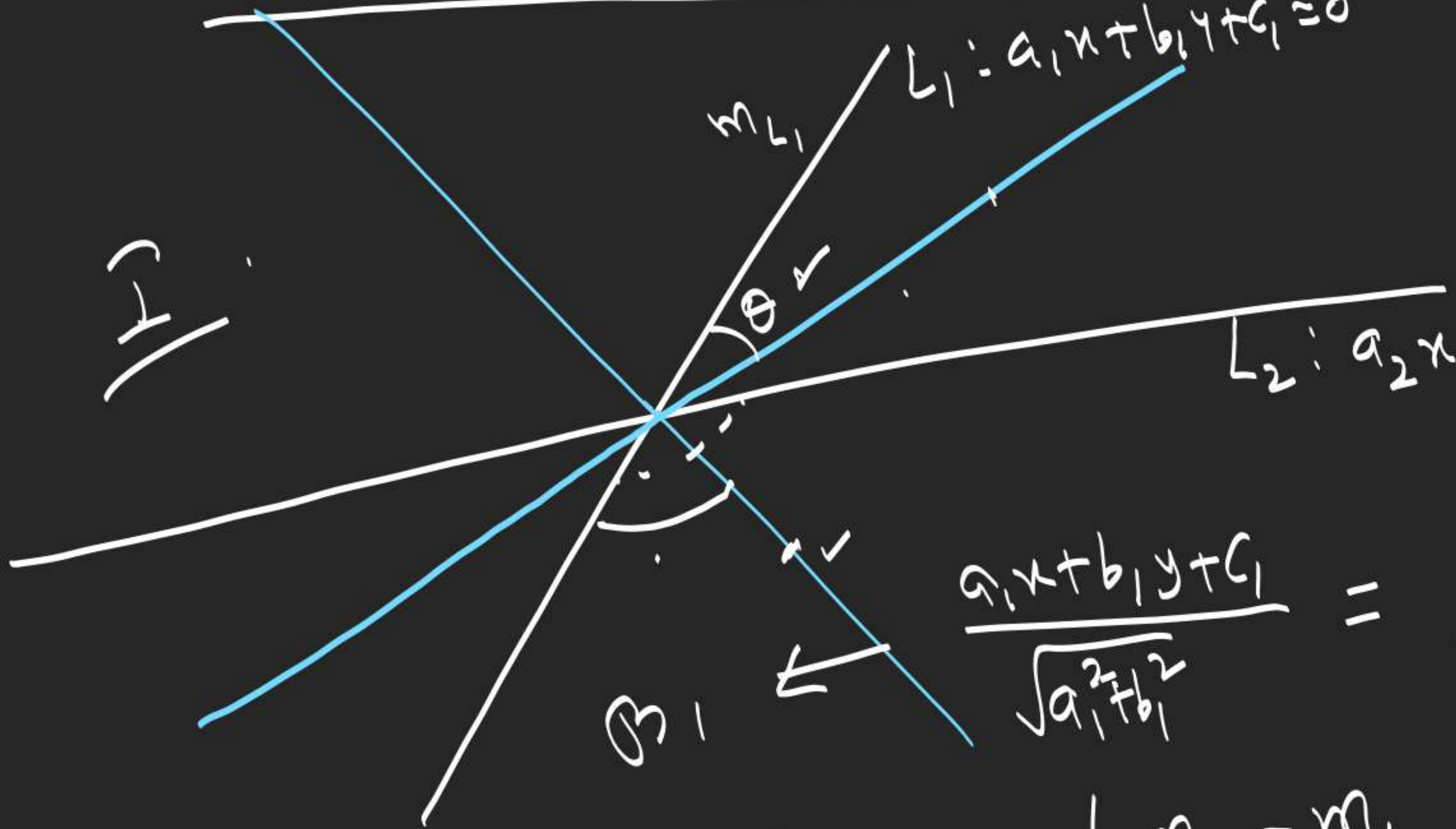
Bisector containing point (α, β) in its region

$$\boxed{\underbrace{(a_1\alpha+b_1\beta+c_1)(a_2\alpha+b_2\beta+c_2)}(a_1h+b_1k+c_1)(a_2h+b_2k+c_2) \geq 0}$$



Nishant Jindal

Acute & Obtuse Angle Bisectors



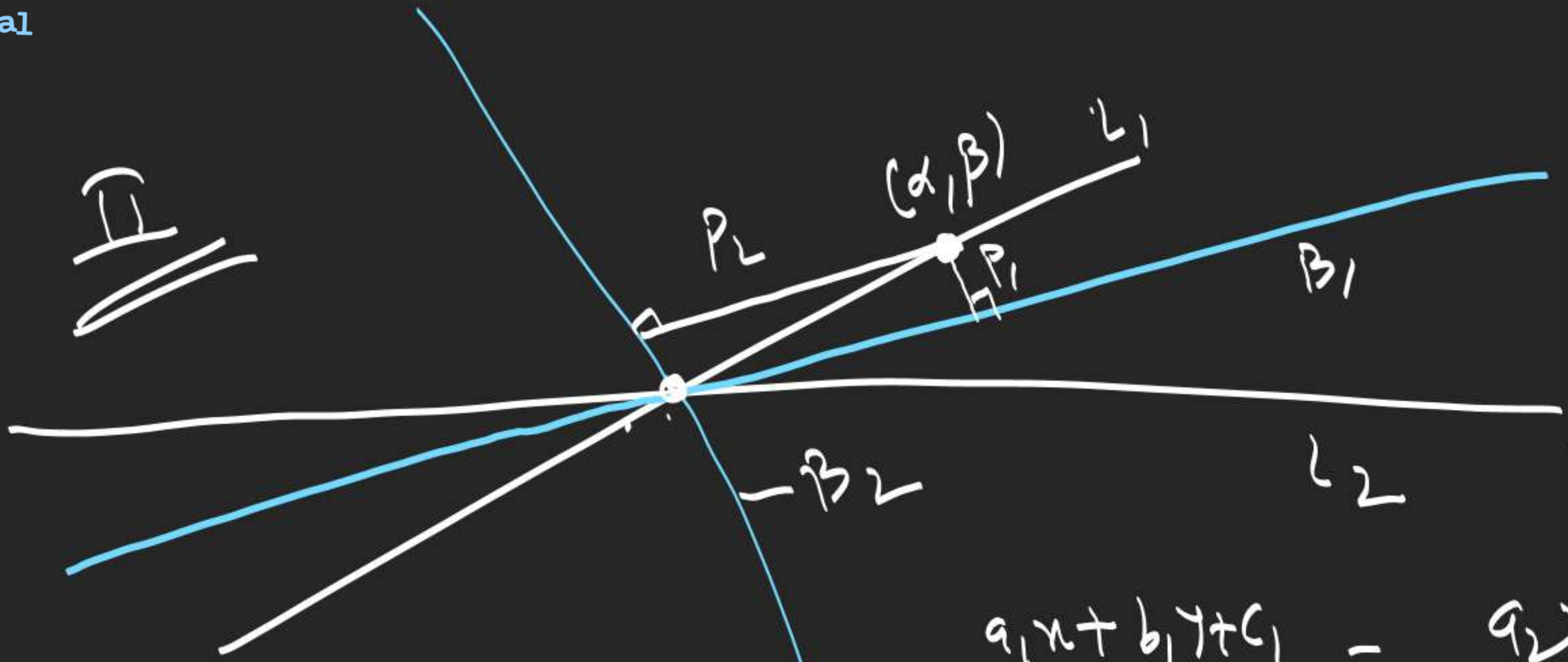
$$\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = \frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}$$

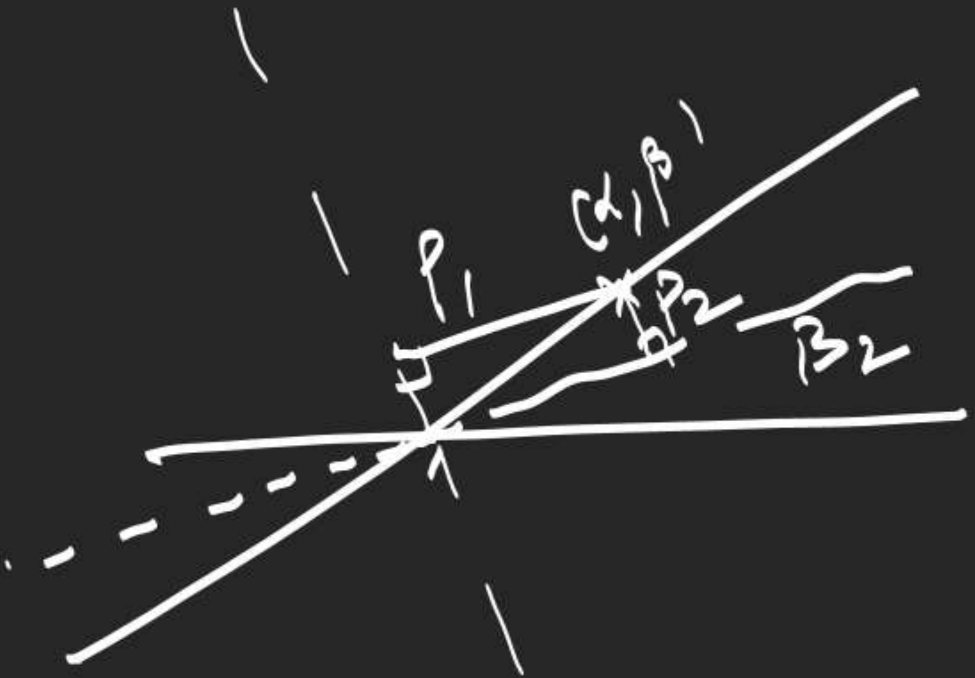
$$\tan\theta = \left|\frac{m_{B_1}-m_{L_1}}{1+m_{B_1}m_{L_1}}\right| < 1 \Rightarrow B_1 \text{ is acute } \angle \text{ bisector.}$$

$> 1 \Rightarrow B_1$ is obtuse.

Nishant Jindal

II





$\checkmark B_1$: $$\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = \frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}$$ $+B_1$

$\checkmark B_2$: $$\frac{a_1x+b_1y+c_1}{\sqrt{a_1^2+b_1^2}} = -\left(\frac{a_2x+b_2y+c_2}{\sqrt{a_2^2+b_2^2}}\right)$$

$P_1 = P_2 \neq 0 \Rightarrow L_1 \perp L_2$

$P_1 < P_2 \Rightarrow B_1$ is acute $\angle$ bisector

$P_1 > P_2 \Rightarrow B_1$ is obtuse —"—

Nishant Jindal

III.

Ex-8 → 6, 7, 10, 11, 13, 15, 18, 21, 24, 29, 30, 31, 32, 34, 36,

SOT → PT-1