Nishant Jindal

$$\vec a \times (\vec b - \vec c) = (\vec c - \vec b) \times \vec d = \vec d \times (\vec b - \vec c)$$

$$(\vec a - \vec d) \times (\vec b - \vec c) = \vec 0$$

$$(\vec a - \vec d) \cdot (\vec b - \vec c) \neq 0$$

$\boxed{\triangle ABC}$

$$\sin C \leq 1$$

$$\sin A \sin B \sin C \leq \sin A \sin B$$

$$1 \leq \cos(A - B)$$

$$0 < \frac{1}{a} < a$$

$$\vec a \times \vec b = \vec 0$$

$$\vec a = \vec 0 \text{ or } \vec b = \vec 0$$

$$\& \quad \vec a \cdot \vec b = 0$$

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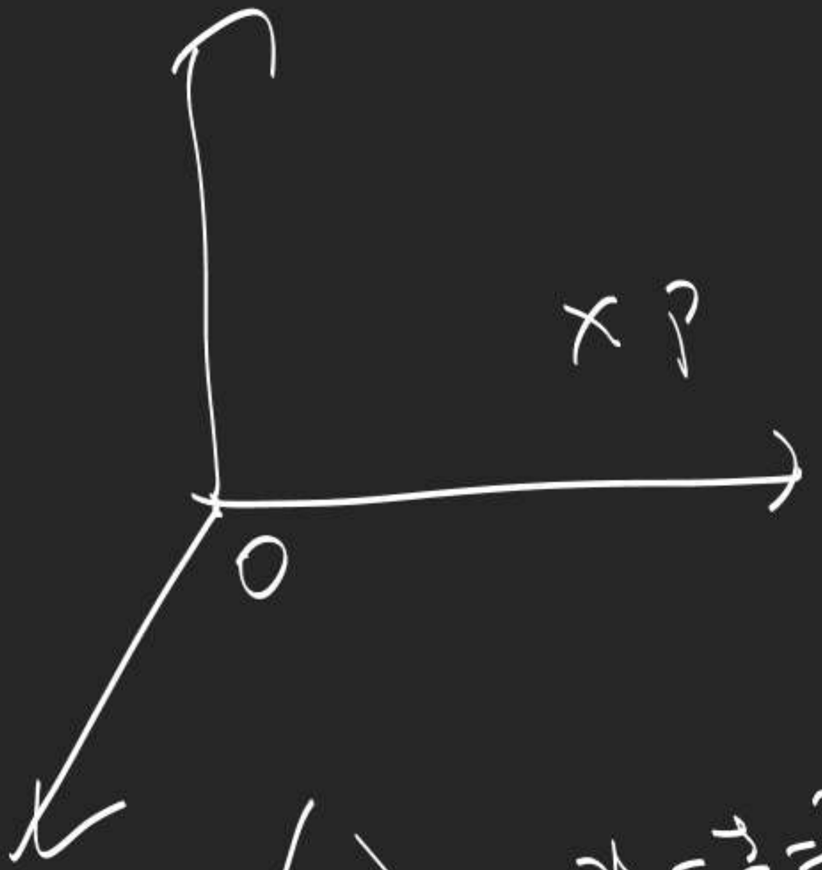

$$\frac{x}{h}=\frac{y}{k}=\frac{z}{l}$$

$$fx+gy+hz=f$$

l, m, λ

$l, m, 0$

$$\therefore lx+my+\lambda z=0$$

$$\cos\theta=\frac{l^2+m^2}{\sqrt{l^2+m^2+\lambda^2}\,\sqrt{l^2+m^2}}$$

$$\lambda=?$$

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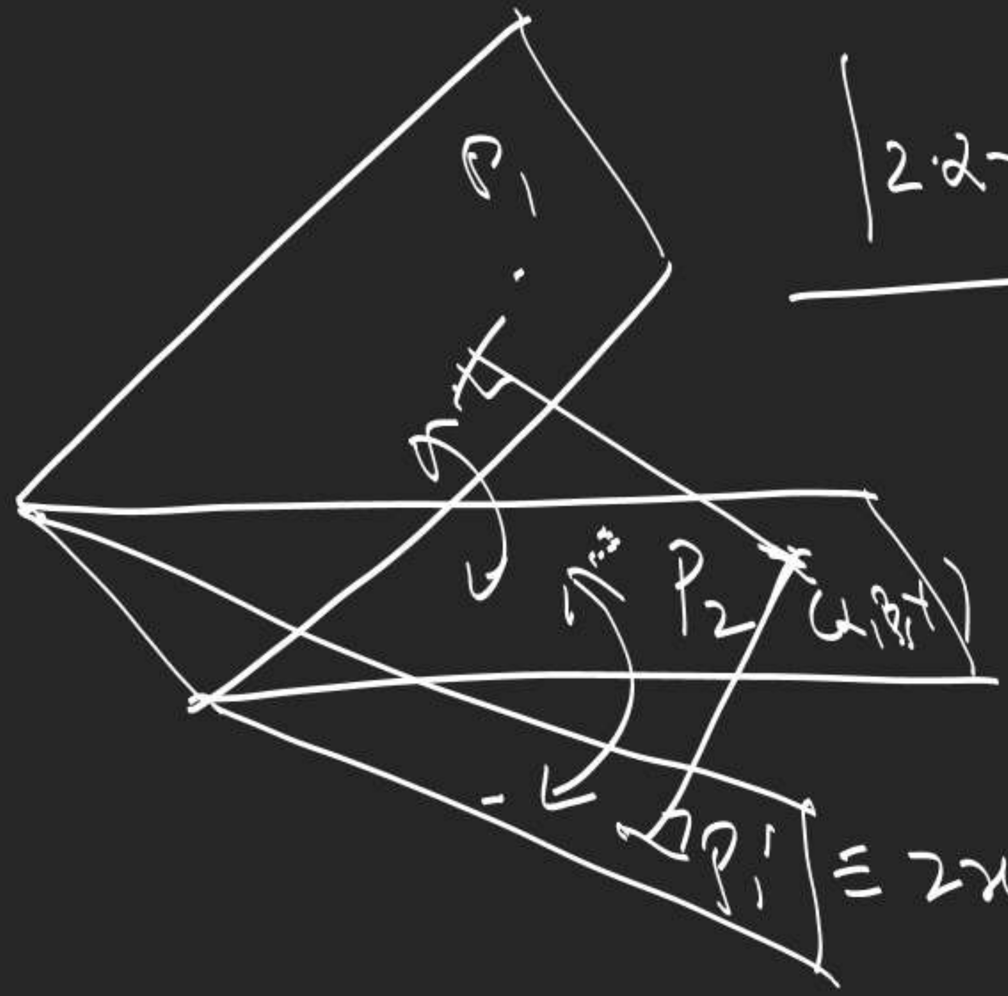

$$\frac{|2\alpha-3\beta+6\gamma+1|}{7}=\frac{|2\alpha-3\beta+6\gamma+1+\lambda(14\alpha-2\beta-5\gamma+3)|}{\sqrt{(2+14\lambda)^2+(2\lambda+3)^2+(5\lambda-6)^2}}$$

0

$$(2+14\lambda)^2+(2\lambda+3)^2+(5\lambda-6)^2=49$$

$$P_1' \equiv 2x-3y+6z+1+\lambda(14x-2y-5z+3)=0$$

$$\lambda=0,\ -\frac{8}{225}$$

Nishant Jindal

1. Find the points in which the line $x = 1+2t$, $y = -1-t$, $z = 3t$ meets the coordinate planes.

$xy \rightarrow z=0 \Rightarrow t=0 \Rightarrow (1,-1,0)$

$yz \rightarrow x=0 \Rightarrow t=-\frac{1}{2} \Rightarrow \left(0,-\frac{1}{2},-\frac{3}{2}\right)$

$zx \rightarrow y=0 \Rightarrow t=-1 \Rightarrow (-1,0,-3)$

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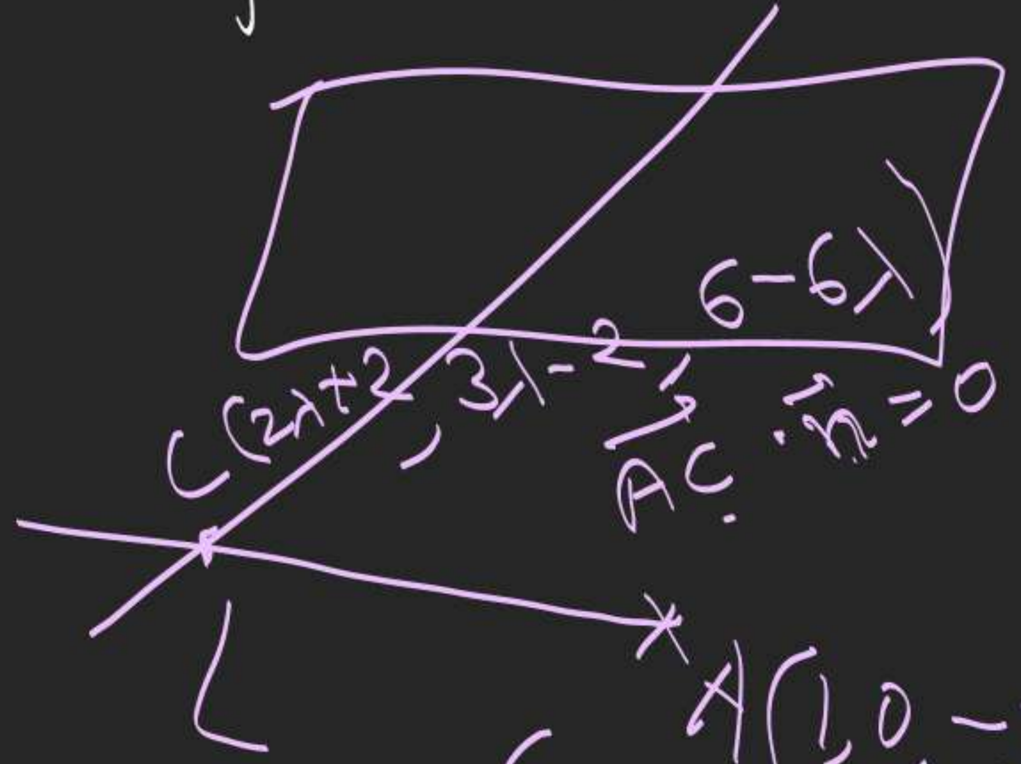
2: Find the distance of point $A(1,0,-3)$ from the plane $P: x-y-z=9$ measured parallel to line $L: \frac{x-2}{2} = \frac{y+2}{3} = \frac{z-6}{-6}$.

Also find the distance of A from 'L' measured parallel to plane 'p'. $|\vec{AC}| = ?$



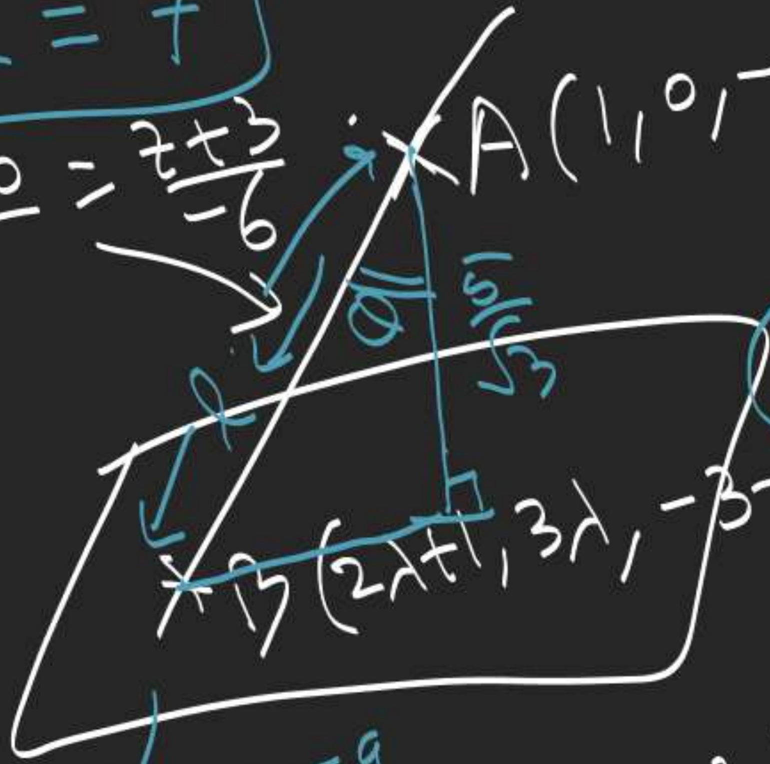
$C(2\lambda+2, 3\lambda-2, 6-6\lambda)$

$\vec{AC} \cdot \vec{n} = 0$

$(2\lambda+1)1 - (3\lambda-2) - (9-6\lambda) = 0$

$\boxed{l = \frac{5}{\sqrt{3}\cos\theta} = 7}$

$\frac{x-1}{2} = \frac{y-0}{3} = \frac{z+3}{-6}$



$\cos\theta = \frac{\vec{n}\cdot\vec{m}}{|\vec{n}||\vec{m}|} = \frac{2-3+6}{\sqrt{3}\,7}$

$\cos\theta = \frac{5}{\sqrt{3}(7)}$

$B(2\lambda+1, 3\lambda, -3-6\lambda) = (3,3,-9)$

$\boxed{AB = 7}$

$\lambda = ?$

$x-y-z=9$

$\frac{|1+3-9|}{\sqrt{3}} = \frac{5}{\sqrt{3}}$

$2\lambda+1-3\lambda+3+6\lambda = 9$

$\lambda = 1$

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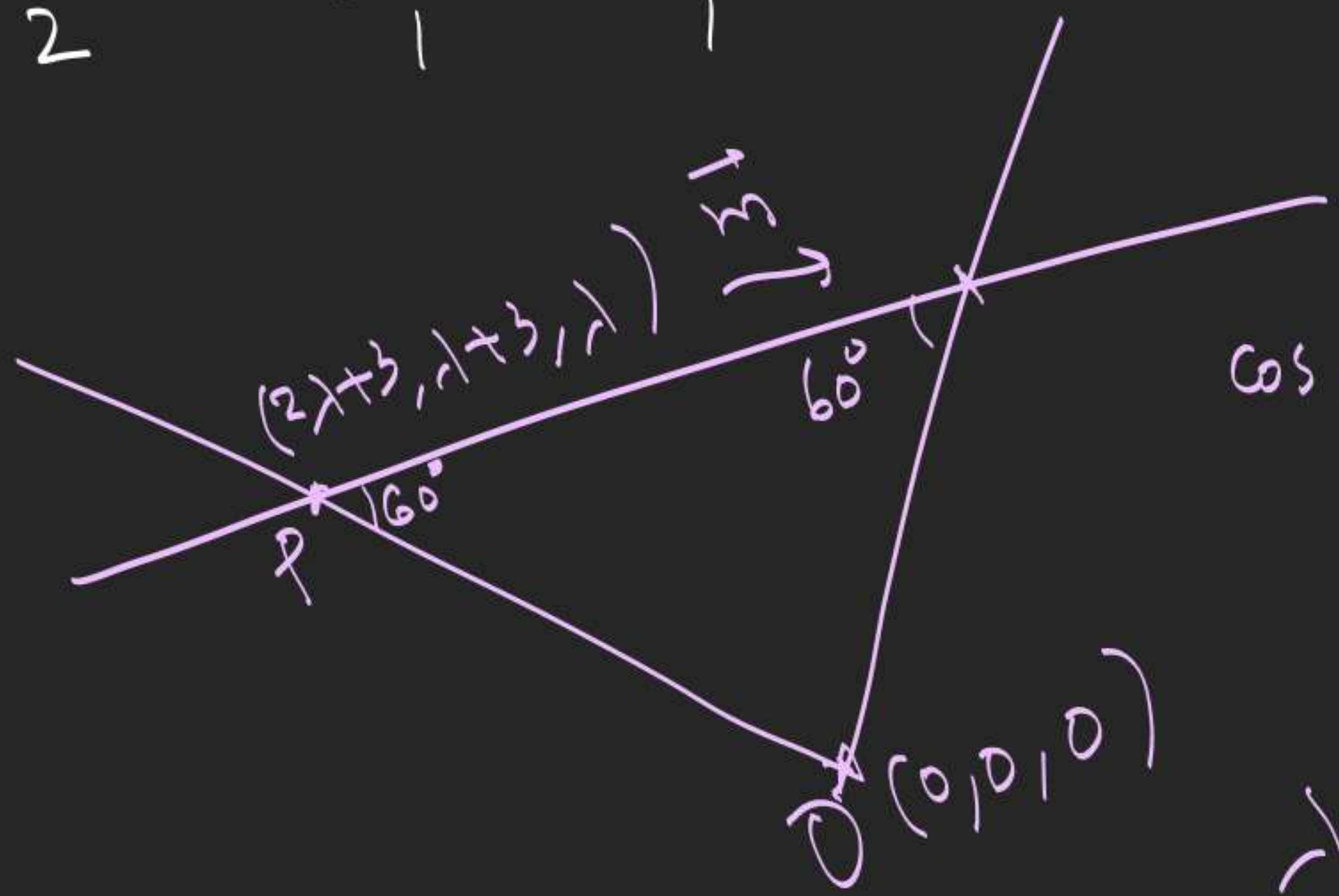
3. Find the eqn. of line thru origin which intersect the line $\dfrac{x-3}{2} = \dfrac{y-3}{1} = \dfrac{z}{1}$ at an angle of $\dfrac{\pi}{3}$.



$$\cos 60^\circ = \frac{(2\lambda+3)2 + (\lambda+3)1 + \lambda(1)}{\sqrt{(2\lambda+3)^2 + (\lambda+3)^2 + \lambda^2}\ \sqrt{6}}$$

$$\lambda = -1, -2.$$

$$\frac{x}{1} = \frac{y}{2} = \frac{z}{-1} \quad \text{or} \quad \frac{x}{-1} = \frac{y}{1} = \frac{z}{-2}.$$

4. If '2d' be the S.D. b/n the lines $\boxed{\frac{y}{b}+\frac{z}{c}=1\ ;\ x=0}$

and $\frac{x}{a}-\frac{z}{c}=1\ ;\ y=0$, then P.T. $\frac{1}{d^2}=\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}$.

L_1 :- $(0,b,0)$, $(0,0,c)$

L_2 = $(a,0,0)$ & $(0,0,-c)$

$$\left|\frac{(a\hat{i}-b\hat{j})\cdot\big((a\hat{i}+c\hat{k})\times(b\hat{j}-c\hat{k})\big)}{\sqrt{a^2b^2+a^2c^2+b^2c^2}}\right|$$

$$ab\,\hat{k}+ac\,\hat{j}-bc\,\hat{i}$$

$$\cancel{2}d=\left|\frac{\cancel{2}abc}{\sqrt{a^2b^2+b^2c^2+c^2a^2}}\right|$$

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5. Find the eqn of plane containing the line

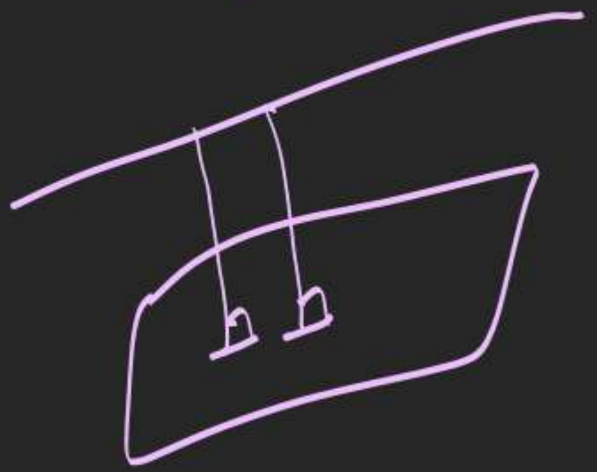
$L_1 : \frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and parallel to line L_2 :

$\frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$. Also find SD b/n L_1 & L_2.

$\vec{a}$, $\vec{m_1}$, $\vec{m_2}$

$$SD = \frac{|2-8+5|}{\sqrt{1+4+1}} = \frac{1}{\sqrt{6}}$$

$$(\vec{r}-\vec{a})\cdot(\vec{m_1}\times\vec{m_2}) = 0$$



$$\begin{vmatrix} x-1 & y-2 & z-3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix} = (x-1)(-1) + 2(y-2) - (z-3) = 0$$

$$-x+2y-z = 0$$

$$\boxed{x-2y+z=0}$$

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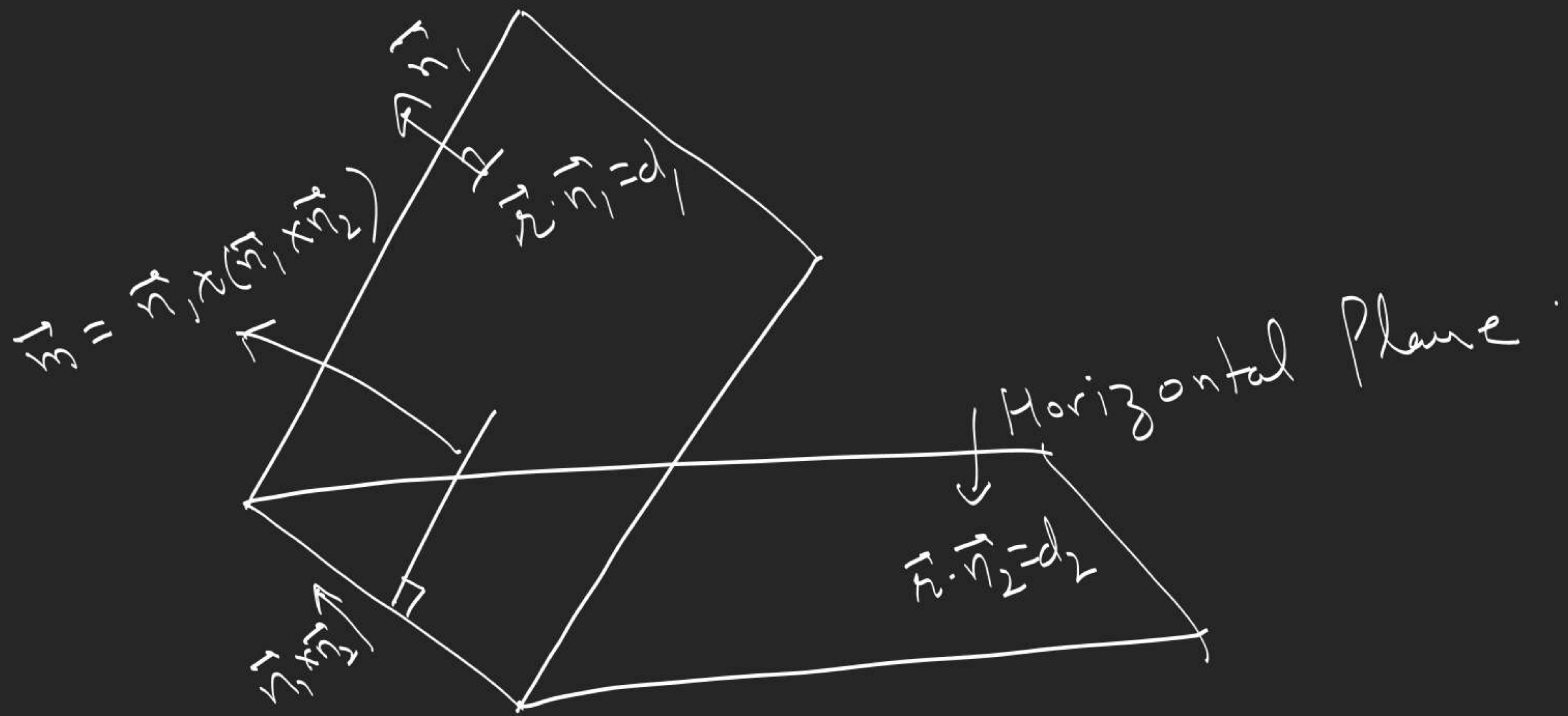
Line of Greatest slope lying in a given plane



6. Assuming the plane $4x-3y+7z=0$ to be horizontal, find the eqn. of line of greatest slope thru the point $(2,1,1)$ in the plane $2x+y-5z=0$.

$$\frac{x-2}{3}=\frac{y-1}{-1}=\frac{z-1}{1}$$

Ex-3 (6-25)

Ex-4 (26-40)