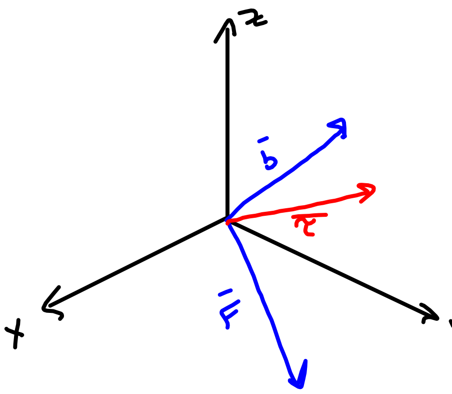


$\bar{\tau}$ = Torque = $\bar{b} \times \bar{F}$

$\bar{b}$ is kind of in yz-plane

$\bar{F}$ " " " " xy-plane

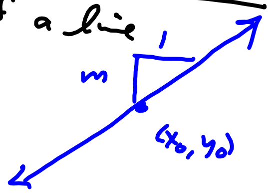
$\bar{\tau}$ " " " into the screen.

$\bar{\tau}$ is axis of rotation

$\|\bar{\tau}\|$ " its tendency to rotate

Recall: Point-slope form of a line

$y - y_0 = m(x - x_0)$

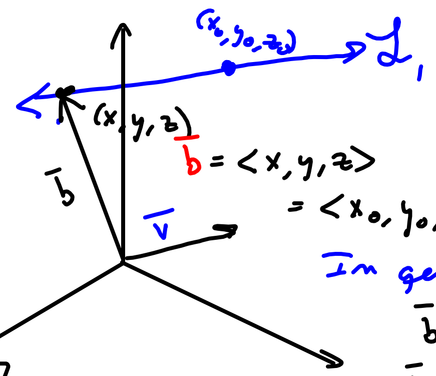


My Way: $y = m(x - x_0) + y_0$

is a line thru (x_0, y_0) with slope m

"A line is a point (position vector) PLUS some multiple of a vector parallel to the line

$\bar{r}_0 = \langle x_0, y_0, z_0 \rangle \longleftrightarrow P(x_0, y_0, z_0)$



$\bar{v}$ is parallel to line $\mathcal{L}_1$

$\bar{b} = \langle x, y, z \rangle$

$= \langle x_0, y_0, z_0 \rangle + -1\bar{v}$ (from pic.)

In general

$\bar{b} = \bar{r}_0 + t\bar{v}$ for all $\bar{b}$ on the line.

$\langle x, y, z \rangle$

$\langle a, b, c \rangle$ in book

$= \bar{b} = \langle x_0, y_0, z_0 \rangle + t\langle v_1, v_2, v_3 \rangle$ for some $t \in \mathbb{R}$

$x = x_0 + tv_1$, $y = y_0 + tv_2$, $z = z_0 + tv_3$

Parametric equations for $\mathcal{L}_1$

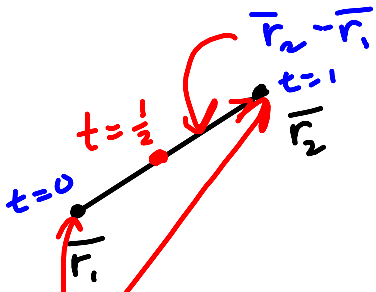
$x - x_0 = tv_1$

$$\frac{x - x_0}{v_1} = t = \frac{y - y_0}{v_2} = \frac{z - z_0}{v_3}$$

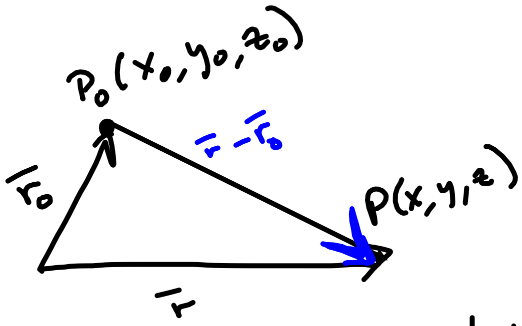
Symmetric Eq'ns for the line.

Line Segment between 2 points (position vectors):

$\bar{r}_1$ & $\bar{r}_2$



$$(1-t)\bar{r}_1 + t\bar{r}_2 \quad \forall\ t \in [0,1]$$



A plane is determined by a point & a vector orthogonal to the plane.

$\bar{n}$

$\bar{r} - \bar{r}_0$ is parallel to the plane

$\bar{r} - \bar{r}_0 = \overrightarrow{P_0P}$

$\bar{n} \perp P \Longrightarrow \bar{n} \cdot (\bar{r} - \bar{r}_0) = 0$

$\bar{n} = \langle a, b, c \rangle \Longrightarrow$

$\bar{n} \cdot (\bar{r} - \bar{r}_0) =$

$\langle a, b, c \rangle \cdot \langle x - x_0, y - y_0, z - z_0 \rangle$

$= a(x - x_0) + b(y - y_0) + c(z - z_0) = 0$

is the equation of the plane thru $\bar{r}_0 = \langle x_0, y_0, z_0 \rangle$ that's perpendicular (orthogonal) to $\bar{n} = \langle a, b, c \rangle$

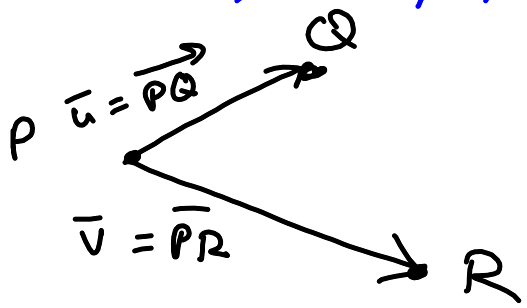
$$\cos \theta = \frac{\bar{r} \cdot \bar{r}_0}{\|\bar{r}\| \|\bar{r}_0\|}$$

ψ = psi $\qquad \cos \psi$

= angle between $\bar{n}$ & the plane (to which $\bar{r} - \bar{r}_0$ is parallel)

Plane thru 3 points

$P(1,-2,3)$, $Q(-5,7,11)$, $R(1,2,3)$



$\bar{u} = \langle -6, 9, 8 \rangle$

$\bar{v} = \langle 0, 4, 0 \rangle$

$$\bar{u} \times \bar{v} \qquad \begin{array}{l} \langle -6, 9, 8 \rangle, -6, 9 \\ \langle 0, 4, 0 \rangle, 0, 4 \\ \hline \langle -32, 0, -24 \rangle = \bar{n}^* \end{array}$$

$\langle -4, 0, -3 \rangle$ is nicer.

Eq'n: $\bar{n} \cdot (\bar{u} - \bar{r}_0$

$$-4(x-1) + 0(y+2) - 3(z-3) = 0$$

$$-4(x-1) - 3(z-3) = 0$$