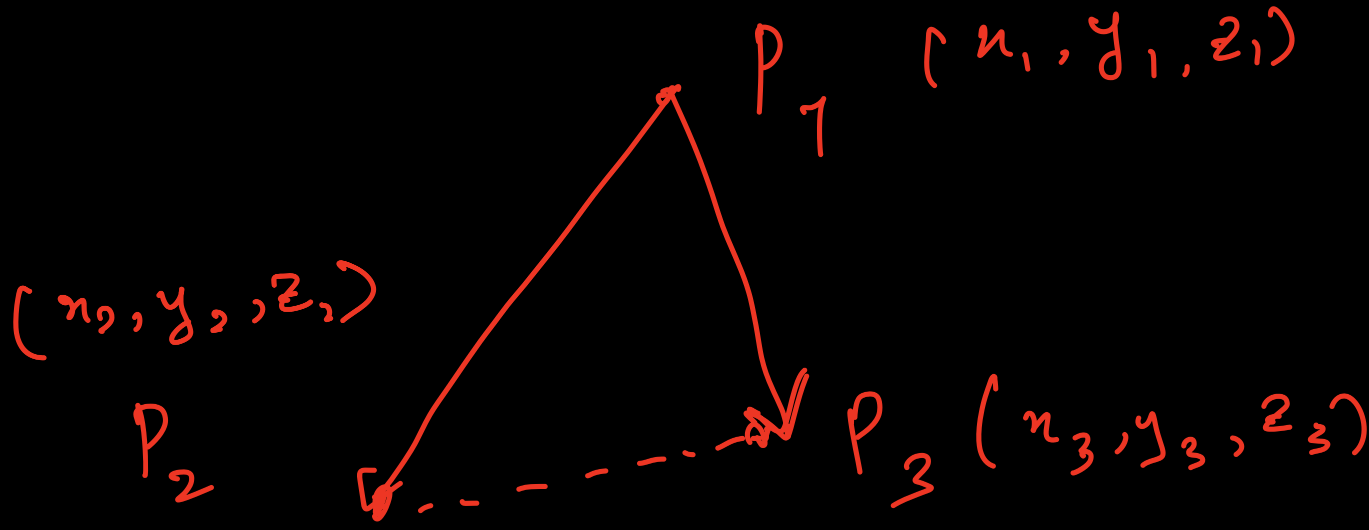


$$\vec{v_1} = P_2 - P_1$$

$$\vec{v_2} = P_3 - P_1$$

Vector originating from P_1 "towards" P_2 & P_3

$$\vec{v_1} = (x_2 - x_1)\hat{i} + (y_2 - y_1)\hat{j} + (z_2 - z_1)k$$

$$\vec{v_2} = (x_3 - x_1)\hat{i} + (y_3 - y_1)j + (z_3 - z_1)k$$

$$\text{Normal} = \vec{n} = \vec{v_1} \times \vec{v_2}$$

$$\boxed{\vec{n} = (a, b, c)}$$

To define a plane, we need :-

1) A normal vector $\vec{n} \to (a, b, c)$

2) A point in the plane.

So,

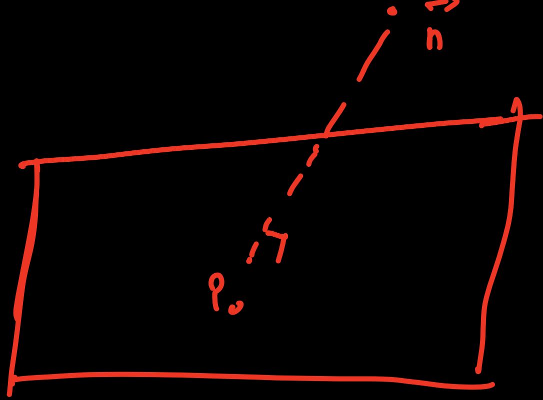
$$(\text{vector on plane}) \cdot (\text{normal}) = 0$$

$\uparrow$ dot product.

$$\therefore \vec{n} \cdot \vec{P_0 P} = 0 .$$

$$= (a\hat{i} + b\hat{j} + c\hat{k}) \cdot ((x_0 - x)\hat{i} + (y_0 - y_0)\hat{j} + (z_0 - z)\hat{k})$$

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



This (a,b,c) are the coefficients to the plane equation

$$a(x-x_1)+b(y-y_1)+c(z-z_1)=0$$

or

$$ax+by+cz+d=0$$

where

$$d = -(ax_1+by_1+c)$$

Distance of a point P_0 to a plane $ax+by+cz+d=0$ is.

$$D = \frac{|ax_0+by_0+cz_0+d|}{\sqrt{a^2+b^2+c^2}}$$