

QUIZ #3

Calculus 160

Spring 2006

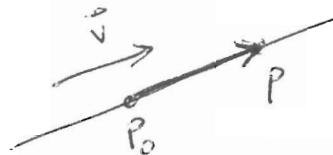
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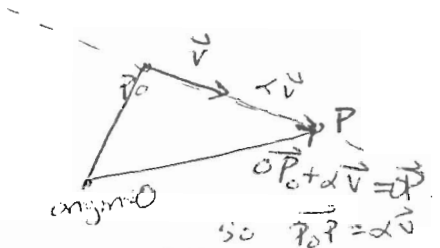
- 1) State the vector equation of a line parallel to the vector $\mathbf{v} = \langle a, b, c \rangle$ and passing through the point $P_0 = (x_0, y_0, z_0)$. Explain what this equation means using a diagram.

The equation is $\overrightarrow{PP_0} = t\vec{v}$, or $\langle x-x_0, y-y_0, z-z_0 \rangle = t\langle a, b, c \rangle$,
 or $\langle x, y, z \rangle = \langle x_0, y_0, z_0 \rangle + t\langle a, b, c \rangle$ for any other P on l .

It means the vector between P_0 and any other point, P , on the line is parallel to \vec{v} .



or



- 2) Find the (scalar) equation of the plane containing the points $A = (1, 3, 2)$, $B = (-1, -1, -1)$ and $C = (0, 2, -1)$.

First find two vectors in the plane: \vec{AB} and \vec{AC} , eg

$$\vec{AB} = \langle -2, -4, -3 \rangle \quad \vec{AC} = \langle -1, -1, -3 \rangle$$

$$\text{Then } \vec{n} = \vec{AB} \times \vec{AC} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -2 & -4 & -3 \\ -1 & -1 & -3 \end{vmatrix} = \begin{vmatrix} -4 & -3 \\ -1 & -3 \end{vmatrix} \vec{i} - \begin{vmatrix} -2 & -3 \\ -1 & -3 \end{vmatrix} \vec{j} + \begin{vmatrix} -2 & -4 \\ -1 & -1 \end{vmatrix} \vec{k}$$

$$= 9\vec{i} - 3\vec{j} + 2\vec{k} = \langle 9, -3, 2 \rangle$$

Then choose one of the points, eg A and put into equation:

$$\rightarrow 9(x-1) - 3(y-3) - 2(z-2) = 0$$

$$9x - 3y - 2z + (-9 + 9 + 4) = 0$$

$$9x - 3y - 2z + 4 = 0$$

$$\boxed{9x - 3y - 2z = -4}$$

now distribute

and move constant to other side

I would accept this, too

(one of these)

this

(one of these)