PROBLEMA 1

1- Calcular la distancia del punto $(1,2,9)$ a la recta

$$r(t) = (4-t)i + (2t+1)j + (5-7t)k$$

$Q(1,2,9)$

$P(4-t)i + (2t+1)j + (5-7t)k$

$V\langle -1, 2, -7\rangle$

$$\overrightarrow{PQ} = \langle 1-(4-t),\ 2-(2t+1),\ 9-(5-7t)\rangle$$
$$\langle -3+t,\ -2t+1,\ 4+7t\rangle$$

$$\overrightarrow{PQ}\cdot V = 0$$
$$(-1)(-3+t)+(2)(-2t+1)+(-7)(4+7t)=0$$
$$3-t-4t+2-28-49t=0$$
$$-54t-23=0$$
$$-54t=23$$
$$t=\frac{23}{-54}$$

$$\overrightarrow{PQ}\ \langle -3+t,\ -2t+1,\ 4+7t\rangle$$
$$\langle -3-{}^{23}/_{54},\ 2({}^{23}/_{54})+1,\ 4-7({}^{23}/_{54})\rangle$$
$$\langle -\frac{162}{54}-\frac{23}{54},\ \frac{46}{54}+\frac{54}{54},\ \frac{216}{54}-\frac{161}{54}\rangle$$

$$\langle -\frac{185}{54},\ \frac{100}{54},\ \frac{55}{54}\rangle$$

$$|\overrightarrow{PQ}| = \sqrt{\left(-\frac{185}{54}\right)^2+\left(\frac{100}{54}\right)^2+\left(\frac{55}{54}\right)^2}$$

$$d = |\overrightarrow{PQ}| \approx \underline{\underline{4.0253\ u}}$$

$$d = \underline{\underline{4.0253\ u}}$$

PROBLEMA 2

2.- Determine la ecuación del plano que pasa por los punto $(-2,1,6)$, $(2,4,5)$ y $(1-2,1)$

$A(-2,1,6)$

$B(2,4,5)$

$C(-1,-2,1)$

$\overrightarrow{AC} = \langle -1+2, -2-1, 1-6 \rangle$

$\langle 1, -3, -5 \rangle$

$\overrightarrow{AB} \; \langle 2+2, 4-1, 5-6 \rangle$

$\langle 4, 3, -1 \rangle$

$$N = \overrightarrow{AB} \times \overrightarrow{AC}$$

$$\begin{vmatrix} i & j & k \\ 4 & 3 & -1 \\ 1 & -3 & -5 \end{vmatrix} = + \begin{vmatrix} 3 & -1 \\ -3 & -5 \end{vmatrix} i - \begin{vmatrix} 4 & -1 \\ 1 & -5 \end{vmatrix} j + \begin{vmatrix} 4 & 3 \\ 1 & -3 \end{vmatrix} k$$

$$\overrightarrow{AB} \times \overrightarrow{AC} \; [(3)(-5) - (-3)(-1)]\,i - [(4)(-5) - (1)(-1)]\,j + [(4)(-3) - (1)(3)]$$

$$[(-15-3)]\,i - [-20+1]\,j + [-12-3]$$

$$-18i + 19j - 15k$$

$N = \langle +18, 19, -15 \rangle$

$P_0 = A(-2,1,6)$

$$-18(x+2) + 19(y-1) - 15(z-6) = 0$$

$$-18x - 36 + 19y - 19 - 15z + 90 = 0$$

$$-18x + 19y - 15z + 35 = 0$$

$$-18x + 19y - 15z + 35 = 0$$

PROBLEMA 3

3- Sea $r(t)$ el vector de posición de una partícula en el espacio calcule el vector velocidad, la rapidez y el vector aceleración en el valor dado d t

$$r(t) = (t^3 - t)i + \left(\frac{6t}{1+t}\right)j + (2t+1)^2 k \qquad t = 1$$

$$r'(t) = (3t^2 - 1)i + \left(\frac{6}{(1+t)^2}\right) + \underset{8t+4}{4(2t+1)}$$

$$\frac{dt}{dt}\frac{6t}{1+t} = \frac{1+t(6) - 6t(1)}{(1+t^2)} = \frac{6 + \cancel{6t} - \cancel{6t}}{(1+t^2)} = \frac{6}{(1+t)^2}$$

$$v(1) = (3(1)^2 - 1)i + \left(\frac{6}{(1+1)^2}\right) + 8(1) + 4$$

$$(2)i + \left(\frac{6}{4}\right)j + 12k \qquad \langle 2, \frac{6}{4}, 12 \rangle \text{ - Velocidad}$$

$$|v(1)| = \sqrt{(2^2) + \left(\frac{6}{4}\right)^2 + (12)^2}$$

$$\sqrt{4 + \frac{12}{8} + 144}$$

$$\sqrt{150.25}$$

$$\approx 12.2576 \longrightarrow \text{rapidez}$$

Velocidad $\langle 2, \frac{6}{4}, 12 \rangle$

Rapidez < 12.2576

Aceleración $\langle 6, \frac{-3}{2}, 8 \rangle$

$$r''(t) = \left(6t - \frac{12}{(t+1)^3} + 8\right)$$

$$\frac{d}{dt}\frac{6}{(t-1)^2} = 6\frac{d}{dt}\left[\frac{1}{((t+1)^2}\right] = 6(-2)(t+1)^{-3} \cdot \frac{d}{dt}[t+1]$$

$$-\frac{12(1+0)}{(t+1)^3} = \frac{12}{(t+1)^3}$$

$$a(1) = 6(1) - \frac{12}{(1+1)^3} + 8$$

$$\langle 6, \frac{-12}{8}, 8 \rangle \text{ - aceleración}$$

$$\langle 6, \frac{-3}{2}, 8 \rangle$$