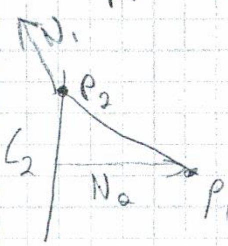
1) $P_1 : (3, 1, -2)$

$L_2 : \begin{array}{l} x = -1 + t \\ y = -2 + t \\ z = -1 + t \end{array}$ $\quad P_2 : (-1, -2, -1)$

$V_2 : \langle 1, 1, 1 \rangle$

$V_{12} : \langle 4, 3, -1 \rangle$

$$N = V_{12} \times V_2 = \left| \begin{array}{ccc|cc} i & j & k & i & j \\ 1 & 1 & 1 & 1 & 1 \\ 4 & 3 & -1 & 4 & 3 \end{array} \right|$$



$$[-i + 4j + 3k] - [4k + 3i - j]$$

$$N_1 : \langle -4, 5, -1 \rangle$$

$$N_2 = N_1 \times V_2 = \left| \begin{array}{ccc|cc} i & j & k & i & j \\ -4 & 5 & -1 & -4 & 5 \\ 1 & 1 & 1 & 1 & 1 \end{array} \right|$$

$$[5i - j - 4k] - [5k - i - 4j]$$

$$N_2 : \langle 6, 3, -9 \rangle$$

~~Line of intersection~~ :

$l : \boxed{\begin{array}{l} x = 3 + 6t \\ y = 1 + 3t \\ z = -2 - 9t \end{array}}$ or $\begin{array}{l} x = 3 + 2u \\ y = 1 + u \\ z = -2 - 3u \end{array}$ $\left\{ \begin{array}{l} \text{Check } \langle 1,1,1 \rangle \cdot \langle 6,3,-9 \rangle = 0 \\ \text{Int-pt } (1,0,1) \text{ of the two lines} \end{array} \right.$

2)

L_1: $x = 2t$
$y = 1 + 3t$
$z = 2 - t$

L_2 $x = 2 + 4t$
$y = -1 + 6t$
$z = -2t$

$\vec{v}_1 : < 2, 3, -1 >$

$p_1 : (0, 1, 2)$

$\vec{v}_2 : < 4, 6, -2 >$

$p_2 : (2, -1, 0)$

$V_1 = 2V_2$ ∴ find another vector on plane.

$\overrightarrow{P_1 P_2} = < 2, -2, -2 >$

$$\vec{N} = \vec{v}_1 \times \overrightarrow{P_1 P_2} = \left| \begin{array}{ccc|cc} i & j & k & i & j \\ 2 & 3 & -1 & 2 & 3 \\ 2 & -2 & -2 & 2 & -2 \end{array} \right|$$

$$[-6i - 2j - 4k] - [6k + 2i - 4j]$$

$$\vec{N} = < -8, 2, -10 >$$

Equation of a plane

$$-8(x - 0) + 2(y - 1) + (-10)(z - 2) = 0$$

$$\boxed{-8x + 2y - 10z + 18 = 0}$$