Taker Name: Key GTID: 90 Section:

Grader #1: GTID: 90

§§12.5: Lines and Planes

Find the plane containing the lines parameterized by

$$\ell_1(t) = \langle 1, 0, 2\rangle + t\langle 2, 1, 0\rangle, \qquad -\infty < t < \infty$$
$$\ell_2(s) = \langle 3, 1, 2\rangle + s\langle -1, 0, 1\rangle, \qquad -\infty < s < \infty$$

Give your answer in the form $Ax + By + Cz = D$ or $a(x - x_0) + b(y - y_0) + c(z - z_0) = 0$.

$\vec{v}_1 = \langle 2,1,0\rangle$ $\quad \vec{n}_1 = \vec{v}_1 \times \vec{v}_2$ is normal

$\vec{v}_2 = \langle -1,0,1\rangle$ $\quad$ to the plane containing ℓ_1 & ℓ_2.

$$\vec{n}_1 = \langle 2,1,0\rangle \times \langle -1,0,1\rangle$$

$$= \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 2 & 1 & 0 \\ -1 & 0 & 1 \end{vmatrix}$$

$$= \hat{\imath}\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix} - \hat{\jmath}\begin{vmatrix} 2 & 0 \\ -1 & 1 \end{vmatrix} + \hat{k}\begin{vmatrix} 2 & 1 \\ -1 & 0 \end{vmatrix}$$

$$= \hat{\imath} - 2\hat{\jmath} - \hat{k} = \langle 1, -2, +1\rangle$$

and $P(1,0,2)$ is in the plane so eqn is

$x - 2y + z = d$ so @ $P(1,0,2)$ $\quad 1 - 2(0) + 2 = d$

$\Rightarrow d = 3$

eqn. is

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

A	
J	
N	

G2:

A	
J	
N	

G3:

A	
J	
N	