Taker Name: Key GTID: 90 Section:

Grader #1: GTID: 90

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G2:

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G3:

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PA#2A- §12.5: Lines and Planes

Find the plane containing the lines parameterized by

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

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

$\vec{v}_1 = \langle 2,2,1\rangle$

$\vec{v}_2 = \langle -1,1,0\rangle$

$\vec{n} = \vec{v}_1 \times \vec{v}_2$

$$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 2 & 1 \\ -1 & 1 & 0 \end{vmatrix}$$

$= \hat{i}(0-1) - \hat{j}(0+1) + \hat{k}(2+2)$

$= \langle -1, -1, 4\rangle$ is orth'l to both lines, so is the normal vector of the plane containing the lines.

Use formula $a(x-x_0) + b(y-y_0) + c(z-z_0) = 0$

w/ $P(x_0, y_0, z_0) = (2, 0, -1)$ (on ℓ_1)

and $\vec{n} = \langle a, b, c\rangle = \langle -1, -1, 4\rangle$ (normal vector)

So plane eqn. is $\boxed{-(x-2) - y + 4(z+1) = 0}$

(or $-x - y + 4z = -6$)