Mo Tu We Th Fr Sa Su

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Session 16: Interseetion of a Line and a Plane

2025.1.9.

$Q_0(-1,2,2)$ $Q_1(1,3,-1)$ plane: $x+2y+4z=7$

~~Note~~ $Q(t) \Rightarrow x(t)+2y(t)+4z(t)$

$=(-1+2t)+2(2+t)+4(2-3t)$

① $=-8t+11$ as $-8t+11=7$, $t=\frac{1}{2}$

$Q(\frac{1}{2})=(0,\frac{5}{2},\frac{1}{2})$ in the plane

if ① =7 , ① =7 , all values satisfy, the line is contained in the plane

elseif ① can't =7, the line is parallel to theplane, the are no pints ~~to~~ of interseetion

Problems:

line: $(13,0)$, $(1,2,4)$

plane: $(0,0,0)$, $(1,1,0)$, $(0,1,1)$

Line:

$\vec{v}=(0,-1,4)$ $\Rightarrow$ $\begin{cases} x=1 \\ y=3-t \\ z=4t \end{cases}$

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planes:

$$\vec{N_1} = \langle 1, 1, 0 \rangle \quad \vec{N_2} = \langle 0, 1, 1 \rangle$$

$$\vec{N} = \vec{N_1} \times \vec{N_2} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{vmatrix} = \vec{i} - \vec{j} + \vec{k} = \langle 1, -1, 1 \rangle$$

plane:

$$\therefore (x-1) - (y-1) + z = 0$$

substituting gives

$$-(3-t-1) + 4t = 0$$

$$-3 + t + 1 + 4t = 0$$

$$5t = 2, \quad t = \frac{2}{5}$$

so point: $(1, 3-\frac{2}{5}, \frac{8}{5}) = (1, \frac{13}{5}, \frac{8}{5})$