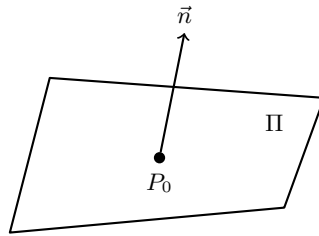


Question 1

Find scalar and vector equations of the plane through $P_0 = (2, -1, 3)$ with normal vector $\vec{n} = \langle 4, 2, -1 \rangle$. Find its intercepts with the coordinate axes.

Question 1 – Solution

Strategy Use $\vec{n} \cdot (\vec{r} - \vec{r}_0) = 0$, then set two coordinates equal to zero for each intercept.



Equations The vector equation is $\langle 4, 2, -1 \rangle \cdot \langle x - 2, y + 1, z - 3 \rangle = 0$, which simplifies to $4x + 2y - z = 3$.

Intercepts The x -, y -, and z -intercepts are

$$(3/4, 0, 0), \quad (0, 3/2, 0), \quad (0, 0, -3).$$

Verification Substituting P_0 gives $8 - 2 - 3 = 3$, and each intercept satisfies the scalar equation.