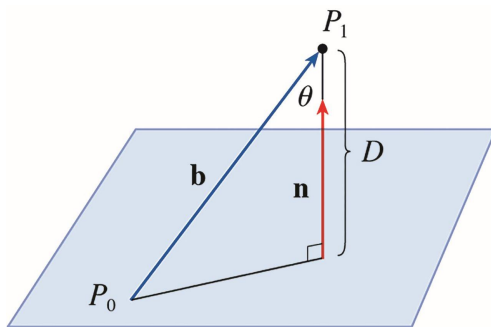


1. Consider the two following lines: one with vector equation $\mathbf{r}_1(s) = \langle 4 - 2s, -2 + s, 1 + 3s \rangle$ and the other being the line through the point $(-4, 2, 17)$ in the direction $\mathbf{v} = \langle -2, 1, 5 \rangle$.
 - (a) Find the direction of the first line.
 - (b) Find a vector equation for the second line, written in terms of the parameter t .
 - (c) Show that the two lines intersect by finding values of s and t that result in the same point. What is the point of intersection?
 - (d) Find an equation for the plane that contains both of the lines described in the problem.

2. Consider the two following planes: one with equation $4x - 5y + z = -2$ and the other which passes through the points $(1, 1, 1)$, $(0, 1, -2)$ and $(4, 2, -1)$.
- (a) Find a normal vector to the first plane.
 - (b) Find a scalar equation for the second plane.
 - (c) Find a point that lies on both planes.
 - (d) The two planes intersect in a line. Find the direction vector for the line of intersection of the two planes.
 - (e) Find parametric equations for the line of intersection of the two planes.

Distance from a point to a plane: Consider a plane through the point P_0 with normal vector $\mathbf{n}$ and a point P_1 that is not on the plane.



The distance D from P_1 to the plane is equal to the length of the projection of $\mathbf{b}$ onto $\mathbf{n}$.

$$D = |\text{comp}_{\mathbf{n}} \mathbf{b}| = \frac{|\mathbf{n} \cdot \mathbf{b}|}{\|\mathbf{n}\|}$$

5. Find the distance between the point $(1, 1, 5)$ and the plane $10x + 2y - 2z = 5$.