

Vectors

1. $A = (1, 9, 5)$, $B = (3, 5, 7)$, $C = (-6, 3, -7)$ and $D = (0, 3, 2)$.
Show that the lines AB and CD are concurrent and find the point of intersection.

2. Find two unit vectors which are perpendicular to both $\mathbf{u} = \mathbf{j} + 4\mathbf{k}$ and $\mathbf{v} = 3\mathbf{i} + 2\mathbf{j} + 4\mathbf{k}$.

3. $A = (1, 2, -2)$, $B = (3, 3, -3)$, $C = (2, 4, -1)$
 - a) Find the equation of the plane Π containing the points A, B and C.
 - b) If L is the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z+2}{3}$ through A, find the equation of the line which passes through A, lies in the plane Π and is perpendicular to L.

4. Find the point where the line $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z}{3}$ intersects the plane $3x + 2y - z = 5$.

5. A line L is the intersection of the planes $x + y + z = 1$ and $x - 2y + 3z = 2$. Find the equation of the plane containing L and passing through the origin.

6. Three planes P_1 , P_2 and P_3 are defined by;
 $P_1: \quad x - 4y - z = 3$
 $P_2: \quad 2x - 2y + z = 6$
 $P_3: \quad 3x - 11y - 2z = 10$
 - a) Show that the planes intersect at a point Q and find the coordinates of Q.
 - b) Find the equation of the line of intersection of P_1 and P_2 and the coordinates of the point where it intersects the x - y plane

7. A plane passes through $A(1, 2, -6)$, $B(1, 0, 3)$ and $C(2, 1, 2)$.
Find the angle between this plane and the line $\frac{x+3}{2} = \frac{y}{3} = \frac{z-1}{4}$