

Question 3

Part A. Equation of a Line (4 Marks)

Find the equation of the line ℓ in \mathbb{R}^2 , which passes through the points $(2, 1)$ and $(1, 3)$.
Let $Q = (1, -3)$ be a point in \mathbb{R}^2 .

- (i) Verify that Q does not lie on the line ℓ .
- (ii) Find the distance between the point Q and the line ℓ .

Part C. Distance from Planes

Give the general form of the equation of the plane π in \mathbb{R}^3 passing through the point $P_0 = (1, 0, 2)$ with the vector $n = (-5, 3, 2)$ as the normal.

Part D. Equations of Planes

Show that the point $Q = (1, -1, 1)$ does not lie in the plane π and find its distance from π .

- Are the points

$$P_1 = (1, 2, 0), \quad P_2 = (3, 5, 0), \quad P_3 = (7, 3, 0), \quad P_4 = (-5, 3, 0)$$

coplanar? If yes, what is the equation of the plane containing them?

1. Find the equation of the line ℓ in \mathbb{R}^2 , which passes through the points $(2, 1)$ and $(1, 3)$.
2. Let $Q = (1, -3)$ be a point in \mathbb{R}^2 .
 - (a) Verify that Q does not lie on the line ℓ .
 - (b) Find the distance between the point Q and the line ℓ .