Assignment-2

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I. Intersection of Conics(CBSE)

Question: Find the length of the intercept cut off by the plane $2x + y - z = 5$ on the x-axis .

Variable	Description	value
$\mathbf{p}$	Point of intercept on the x-axis	$\begin{pmatrix} x \\ 0 \\ 0 \end{pmatrix}$
$\mathbf{x}$	x-coordinate of the intercept	$\frac{5}{2}$ or 2.5
$\mathbf{n}^\top\mathbf{x}$	Dot product of the normal vector and point on the plane	5
Plane Equation	Equation of the plane	$\mathbf{n}^\top\mathbf{x} = 5$

Table 1
Variables Used

Solution: Equation of plane $\mathbf{n}^\top\mathbf{x} = 5$
$\mathbf{p}$ be intercept on x-axis

$$\mathbf{p} = \begin{pmatrix} x \\ 0 \\ 0 \end{pmatrix} \tag{1}$$

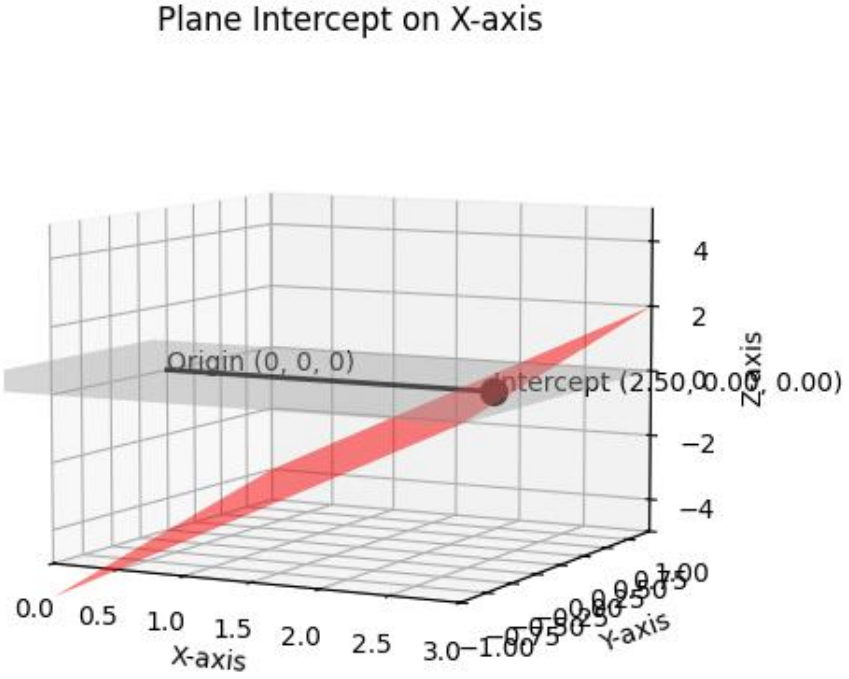
$$\mathbf{n}^\top(\mathbf{x} - \mathbf{p}) = 0 \tag{2}$$

$$\mathbf{n}^\top\mathbf{x} - \mathbf{n}^\top\mathbf{p} = 0 \tag{3}$$

$$5 - 2\mathbf{x} = 0 \tag{4}$$

$$\mathbf{x} = \frac{5}{2} \tag{5}$$

Therefore, the length of the intercept cut off by the plane on the x-axis is $\frac{5}{2}$ or 2.5


Plane Intercept on X-axis
Origin (0, 0, 0)
Intercept (2.50, 0.00, 0.00)
4
2
−2
−4
Z-axis
0.0
0.5
1.0
1.5
2.0
2.5
3.0
X-axis
Y-axis