

Assignment 1

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Download all python codes from

<https://github.com/neharani289/ee14014/Assignment1/codes>

and latex-tikz codes from

<https://github.com/neharani289/ee14014/Assignment1>

1 Q NO. 46

what are the points on the y-axis whose distance from the line $(4 \ 3)x = 12$ is 4 units.

2 SOLUTION

Here, direction vectors of the lines are $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$

Using the formula for the distance of a point P from a line

$$d = \frac{|\mathbf{n}^T \mathbf{P} - c|}{\|\mathbf{n}\|} \quad (2.0.1)$$

normal vector n is given by,

$$\mathbf{n} = \begin{pmatrix} 4 \\ 3 \end{pmatrix} \quad (2.0.2)$$

Since the point lies on the y-axis. let

$$\mathbf{P} = \begin{pmatrix} 0 \\ k \end{pmatrix} \quad (2.0.3)$$

If the equation of the line is :

$$\mathbf{n}^T \mathbf{x} = c \quad (2.0.4)$$

$$\Rightarrow \frac{|\mathbf{n}^T \mathbf{P} - c|}{\|\mathbf{n}\|} = 4 \quad (2.0.5)$$

$$\Rightarrow 3k - 12 = \pm 20 \quad (2.0.6)$$

$$\Rightarrow k = \begin{pmatrix} 0 \\ -8 \end{pmatrix} \text{ and } k = \begin{pmatrix} 0 \\ 32/3 \end{pmatrix} \quad (2.0.7)$$

therefore points on y-axis at distance of P from line are $\begin{pmatrix} 0 \\ -8 \end{pmatrix}$ and $\begin{pmatrix} 0 \\ 32/3 \end{pmatrix}$.

