

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>

$$d = \frac{(P3 - P1)^T n}{\|n\|} \quad (0.0.6)$$

$$\Rightarrow 4 = \frac{\begin{pmatrix} 0 \\ (b-4) \end{pmatrix}^T \begin{pmatrix} 4 \\ 3 \end{pmatrix}}{5} \quad (0.0.7)$$

$$20 = 3b - 12 \quad (0.0.8)$$

$$b = 32/3 \quad (0.0.9)$$

therefore points on y-axis at 4 units distance from line are (0,-8) and (0,32/3).

Q no. 46. what are the points on the y-axis whose distance from the line $(4 \ 3)x = 12$ is 4 units.

Solution:

Here the slope of the line is $-4/3$, thus the direction vectors of the lines are $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$
finding the normal vector n ,

$$n = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 3 \\ -4 \end{pmatrix} \quad (0.0.1)$$

$$\Rightarrow n = \begin{pmatrix} 4 \\ 3 \end{pmatrix} \quad (0.0.2)$$

now distance between a given line which meet y-axis at point $P1(0,4)$ and desired point $P2(0,b)$ and $P3(0,a)$ is at 4 units distance from the line is given by

$$d = \frac{(P1 - P2)^T n}{\|n\|} \quad (0.0.3)$$

$$\Rightarrow 4 = \frac{\begin{pmatrix} 0 \\ (4-a) \end{pmatrix}^T \begin{pmatrix} 4 \\ 3 \end{pmatrix}}{5} \Rightarrow 20 = 12 - 3a \quad (0.0.4)$$

$$a = -8/3 \quad (0.0.5)$$

similarly distance between given line and the desired point $P3$ can be calculated as: