Assignment 1

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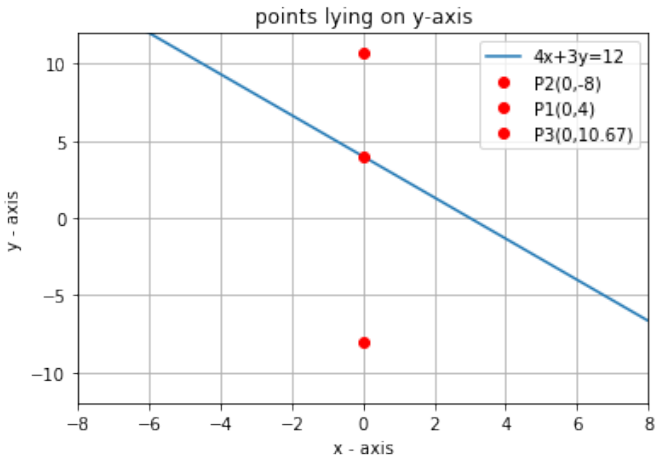
Download all python codes from

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

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

normal vector n is given by,

$$\mathrm{n} = \begin{pmatrix} 4 \\ 3 \end{pmatrix} \tag{2.0.2}$$

Since the point lies on the y-axis. let

$$P = \begin{pmatrix} 0 \\ k \end{pmatrix} \tag{2.0.3}$$

If the equation of the line is :

$$\mathbf{n}^T x = c \tag{2.0.4}$$

$$\frac{|\mathbf{n}^T P - c|}{\|\mathbf{n}\|} = 4 \tag{2.0.5}$$

$$\implies 3k - 12 = \pm 20 \tag{2.0.6}$$

$$\implies k = \begin{pmatrix} 0 \\ -8 \end{pmatrix} and \begin{pmatrix} 0 \\ 32/3 \end{pmatrix} \tag{2.0.7}$$

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