

# Assignment 1

Aayush Arora

Download all python codes from

<https://github.com/aayush-1/EE5609-Matrix-Theory/tree/master/codes>

and latex-tikz codes from

<https://github.com/aayush-1/EE5609-Matrix-Theory>

$$\begin{pmatrix} 4 & 3 \end{pmatrix} \mathbf{x} = 32 \quad (2.0.5)$$

$$\begin{pmatrix} 4 & 3 \end{pmatrix} \mathbf{x} = -8 \quad (2.0.6)$$

Finally the points on x-axis are:

$$\mathbf{x} = 8 \quad (2.0.7)$$

$$\mathbf{x} = -2 \quad (2.0.8)$$

## 1 QUESTION NO. 34

Find the points on the x-axis, whose distances from the line

$$\begin{pmatrix} 4 & 3 \end{pmatrix} \mathbf{x} = 12 \quad (1.0.1)$$

are 4 units.

## 2 EXPLANATION

First we can find the lines at a distance of 4 from the given line and then it's intersection with the x-axis.

$$\mathbf{n} = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$$

The parallel lines must have the same slope but different intercepts. Hence the lines must be of the form:

$$\begin{pmatrix} 4 & 3 \end{pmatrix} \mathbf{x} = c_1 \quad (2.0.1)$$

$$\begin{pmatrix} 4 & 3 \end{pmatrix} \mathbf{x} = c_2 \quad (2.0.2)$$

These  $c_1$  and  $c_2$  can be easily found by evaluating the distance between the parallel lines:

$$\frac{|(c - 12)|}{\sqrt{4^2 + 3^2}} = 4 \quad (2.0.3)$$

$$c = 12 \pm 20 \quad (2.0.4)$$

The two parallel lines at a distance of 4 thus obtained are:

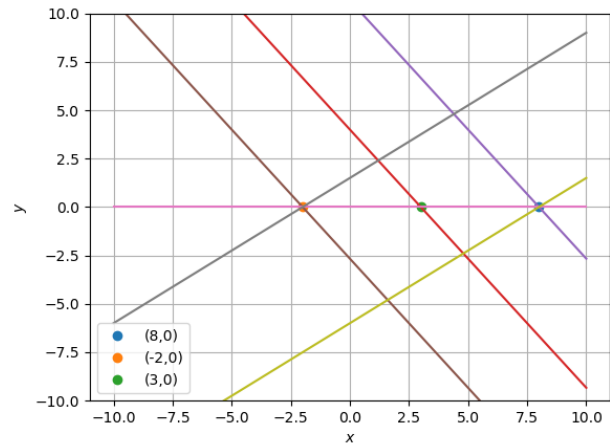


Fig. 0: Points on x-axis at a distance of 4 from the given line