

# Matrix theory Assignment 1

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**Abstract**—This document explains the equation of the line passing through the point of intersection of the lines that has equal intercepts on the axes

Download all python codes from

<https://github.com/pavanmanesh/EE5609/tree/master/codes>

and latex-tikz codes from

<https://github.com/pavanmanesh/EE5609>

As per the question , $a=b$ . So, The line equation becomes

$$(1 \ 1)\mathbf{x} = a$$

As the line passes through the point of intersection (0.07, 0.38), the line equation is

$$(1 \ 1)\mathbf{x} = 0.45$$

Plot of the two lines:

## 1 PROBLEM

Find the equation of the line passing through the point of intersection of the lines

$$(4 \ 7)\mathbf{x} = 3$$

$$(2 \ -3)\mathbf{x} = -1$$

that has equal intercepts on the axes

## 2 SOLUTION

Constructing the augmented matrix

$$\begin{pmatrix} 4 & 7 & 3 \\ 2 & -3 & -1 \end{pmatrix}$$

Transforming the matrix into row-echelon form

$$\begin{aligned} & \begin{pmatrix} 4 & 7 & 3 \\ 2 & -3 & -1 \end{pmatrix} \xrightarrow{R2 \leftarrow 2R2 - R1} \\ & \begin{pmatrix} 4 & 7 & 3 \\ 0 & -13 & -5 \end{pmatrix} \xrightarrow{R2 \leftarrow -R2/13, R1 \leftarrow R1/4} \\ & \begin{pmatrix} 1 & 7/4 & 3/4 \\ 0 & 1 & 5/13 \end{pmatrix} \xrightarrow{R1 \leftarrow R1 - 7/4R2/4} \\ & \begin{pmatrix} 1 & 0 & 2/26 \\ 0 & 1 & 5/13 \end{pmatrix} \quad (2.0.1) \end{aligned}$$

Thus, The point of intersection is at point  $(2/26, 5/13)$  i.e. (0.07, 0.38) and we know that the standard equation for the line with intercepts in vector form is ,

$$(1/a \ 1/b)\mathbf{x} = 1$$