

# Assignment No.4

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Download all python codes from

<https://github.com/sravani706/Assignment-4.git>

and latex-tikz codes from

<https://github.com/sravani706/Assignment-4.git>

Question taken from

[https://github.com/gadepall/ncert/blob/main/linalg/linear\\_forms/gvv\\_ncert\\_linear\\_forms.pdf](https://github.com/gadepall/ncert/blob/main/linalg/linear_forms/gvv_ncert_linear_forms.pdf)

## 1 LINEAR FORMS EXERCISE 2.5(B)

Find out whether the following pair of linear equations are consistent, or inconsistent.

$$\begin{pmatrix} 2 & -3 \end{pmatrix} \mathbf{x} = 8 \quad (1.0.1)$$

$$\begin{pmatrix} 4 & -6 \end{pmatrix} \mathbf{x} = 9 \quad (1.0.2)$$

## 2 SOLUTION

$$\begin{pmatrix} 2 & -3 \end{pmatrix} \mathbf{x} = 5 \quad (2.0.1)$$

$$\begin{pmatrix} 4 & -6 \end{pmatrix} \mathbf{x} = 9 \quad (2.0.2)$$

The above equations can be expressed as the matrix equation

$$\begin{pmatrix} 2 & -3 \\ 4 & -6 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 8 \\ 9 \end{pmatrix} \quad (2.0.3)$$

The augmented matrix for the above equation is row reduced as follows:

$$\begin{pmatrix} 2 & -3 & 8 \\ 4 & -6 & 9 \end{pmatrix} \xrightarrow{R_1 \leftarrow R_1 + 3} \begin{pmatrix} 5 & 0 & 11 \\ 4 & -6 & 9 \end{pmatrix} \quad (2.0.4)$$

$$\xrightarrow{R_1 \leftarrow \frac{R_1}{5}} \begin{pmatrix} 1 & 0 & \frac{11}{5} \\ 4 & -6 & 9 \end{pmatrix} \quad (2.0.5)$$

$$\xrightarrow{R_2 \leftarrow R_2 - 4} \begin{pmatrix} 1 & 0 & \frac{11}{5} \\ 0 & -10 & 5 \end{pmatrix} \quad (2.0.6)$$

$$\xrightarrow{R_2 \leftarrow \frac{R_2}{-10}} \begin{pmatrix} 1 & 0 & \frac{11}{5} \\ 0 & -1 & -\frac{1}{2} \end{pmatrix} \quad (2.0.7)$$

So by reduction of the  $(2 \times 3)$  matrix

$$\begin{pmatrix} 2 & -3 & 8 \\ 4 & -6 & 9 \end{pmatrix} \quad (2.0.8)$$

gives matrix with 2 nonzero row, So it's rank is 2.

$$\begin{pmatrix} 2 & -3 \\ 4 & -6 \end{pmatrix} \quad (2.0.9)$$

Also, the rank of the above matrix is also 2.  
 $\therefore$  lines are Inconsistent.

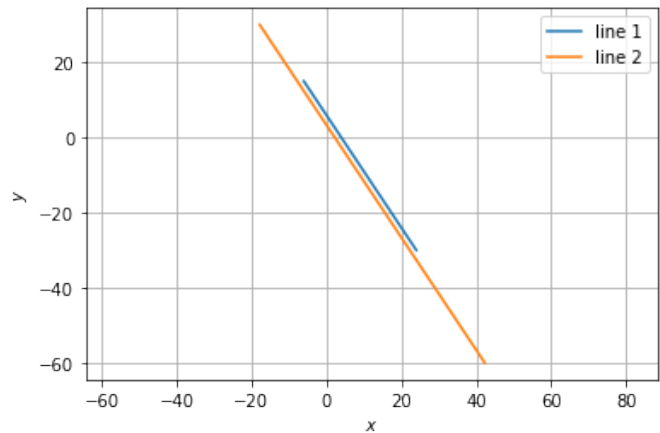


Fig. 2.1: Graphical solution

$\therefore$  This figure verifies that two lines are not intersecting at one point.