

Assignment No.4

Abhishek Nayak

Download all python codes from

<https://github.com/Abhishek7008/Assignment-4.git>

and latex-tikz codes from

<https://github.com/Abhishek7008/Assignment-4.git>

Question taken from

https://github.com/gadepall/ncert/blob/main/linalg/linear_forms/gvv_ncert_linear_forms.pdf

So reduction of the 2×3 matrix

$$\begin{pmatrix} 3 & 2 & 5 \\ 2 & -3 & 7 \end{pmatrix} \quad (2.0.8)$$

results in a matrix with 2 nonzero row, its rank is 2. Similarly, the rank of the matrix

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

is also 2.

\therefore lines are Consistent and gives unique solution.

1 LINEAR FORMS EXERCISE 2.5(A)

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

$$(3 \ 2)\mathbf{x} = 5 \quad (1.0.1)$$

$$(2 \ -3)\mathbf{x} = 7 \quad (1.0.2)$$

2 SOLUTION

$$(3 \ 2)\mathbf{x} = 5 \quad (2.0.1)$$

$$(2 \ -3)\mathbf{x} = 7 \quad (2.0.2)$$

The above equations can be expressed as the matrix equation

$$\begin{pmatrix} 3 & 2 \\ 2 & -3 \end{pmatrix} \mathbf{x} = \begin{pmatrix} 5 \\ 7 \end{pmatrix} \quad (2.0.3)$$

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

$$\begin{pmatrix} 3 & 2 & 5 \\ 2 & -3 & 7 \end{pmatrix} \xrightarrow{R_1 \leftarrow \frac{1}{3}R_1} \begin{pmatrix} 1 & \frac{2}{3} & \frac{5}{3} \\ 2 & -3 & 7 \end{pmatrix} \quad (2.0.4)$$

$$\xrightarrow{R_2 \leftarrow -2R_1 + R_2} \begin{pmatrix} 1 & \frac{2}{3} & \frac{5}{3} \\ 0 & -\frac{13}{3} & \frac{11}{3} \end{pmatrix} \quad (2.0.5)$$

$$\xrightarrow{R_2 \leftarrow -\frac{3}{13}R_2} \begin{pmatrix} 1 & \frac{2}{3} & \frac{5}{3} \\ 0 & 1 & -\frac{11}{13} \end{pmatrix} \quad (2.0.6)$$

$$\xrightarrow{R_1 \leftarrow -\frac{2}{3}R_2 + R_1} \begin{pmatrix} 1 & 0 & \frac{29}{13} \\ 0 & 1 & -\frac{11}{13} \end{pmatrix} \quad (2.0.7)$$

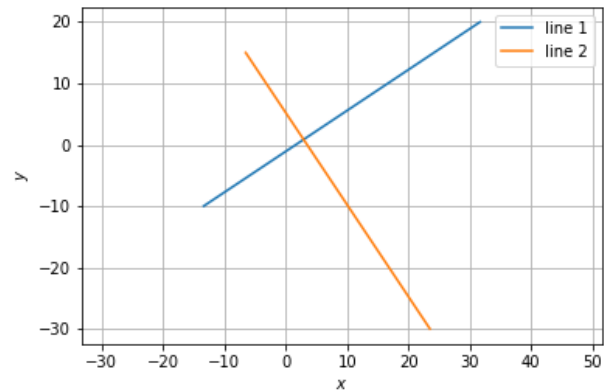


Fig. 2.1: Graphical solution

\therefore This figure verifies that two lines are intersecting at one point.