ASSIGNMENT 4

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Download all python codes from

https://github.com/K.NIKHITHA/ASSIGNMENT4/tree/main/ASSIGNMENT4/CODES

and latex-tikz codes from

https://github.com/K.NIKHITHA/ASSIGNMENT4/tree/main/ASSIGNMENT4

1 Question No 2.20

Find the value of p so that the three lines

$$\begin{pmatrix}3 & 1\end{pmatrix}\mathbf{x} = 2 \tag{1.0.1}$$

$$\begin{pmatrix}p & 2\end{pmatrix}\mathbf{x} = 3 \tag{1.0.2}$$

$$\begin{pmatrix}2 & -1\end{pmatrix}\mathbf{x} = 3 \tag{1.0.3}$$

may intersect at one point

2 SOLUTION

Given, the system of equations in matrix equation format are as below

$$\begin{pmatrix}3 & 1\\ p & 2\\ 2 & -1\end{pmatrix}\mathbf{x} = \begin{pmatrix}2\\3\\3\end{pmatrix} \tag{2.0.1}$$

Assuming the system of equations are consistent , let reduce the augmented matrix , to find the value of p

$$\begin{pmatrix}3 & 1 & 2\\ p & 2 & 3\\ 2 & -1 & 3\end{pmatrix} \xleftrightarrow{R_2 \leftarrow R_2 - 2R_1} \begin{pmatrix}3 & 1 & 2\\ P-6 & 0 & -1\\ 2 & -1 & 3\end{pmatrix} \tag{2.0.2}$$

$$\xleftrightarrow{R_3 \leftarrow 3R_3 - 2R_1} \begin{pmatrix}3 & 1 & 2\\ p-6 & 0 & -1\\ 0 & -5 & 5\end{pmatrix} \tag{2.0.3}$$

$$\xleftrightarrow{R_3 \leftarrow -\frac{R_3}{5}} \begin{pmatrix}3 & 1 & 2\\ p-6 & 0 & -1\\ 0 & 1 & -1\end{pmatrix} \tag{2.0.4}$$

$$\begin{pmatrix}3 & 1 & 2\\ p-6 & 0 & -1\\ 0 & 1 & -1\end{pmatrix} \tag{2.0.5}$$

since the system of equations are assumed consistent,

$$\implies p - 6 = -1 \tag{2.0.6}$$

$$\implies p = 5 \tag{2.0.7}$$

$\therefore$ The system of equations can be represented as vectors as below:

$$\begin{pmatrix}3 & 1\end{pmatrix}\mathbf{x} = 2 \tag{2.0.8}$$

$$\begin{pmatrix}5 & 2\end{pmatrix}\mathbf{x} = 3 \tag{2.0.9}$$

$$\begin{pmatrix}2 & -1\end{pmatrix}\mathbf{x} = 3 \tag{2.0.10}$$

PLOT OF GIVEN LINES -

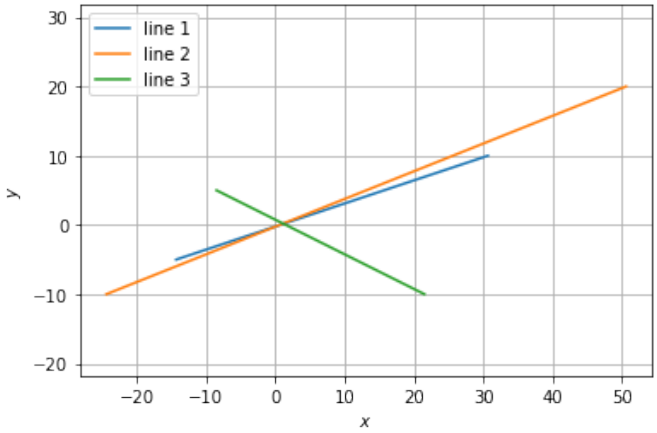

Fig. 2.1: INTERSECTING LINES.