4.3.37

EE25BTECH11047 - RAVULA SHASHANK REDDY

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Question: Find the equation of the line passing through the points

$$\mathbf{A} = \begin{pmatrix}1\\2\end{pmatrix}, \quad \mathbf{B} = \begin{pmatrix}3\\6\end{pmatrix}.$$

Solution:

$$\begin{pmatrix}\mathbf{A} & \mathbf{B}\end{pmatrix}^T \mathbf{n} = \begin{pmatrix}1\\1\end{pmatrix} \tag{1}$$

$$\begin{pmatrix}1 & 2\\3 & 6\end{pmatrix}\mathbf{n} = \begin{pmatrix}1\\1\end{pmatrix} \tag{2}$$

$$\begin{pmatrix}1 & 2 & 1\\3 & 6 & 1\end{pmatrix} \xrightarrow{R_2-3R_1} \begin{pmatrix}1 & 2 & 1\\0 & 0 & -2\end{pmatrix} \tag{3}$$

$$0 = -2 \tag{4}$$

Inconsistent.Hence c=0.

$$\begin{pmatrix}1 & 2\\3 & 6\end{pmatrix}\mathbf{n} = \begin{pmatrix}0\\0\end{pmatrix} \tag{5}$$

$$\begin{pmatrix}1 & 2 & 0\\3 & 6 & 0\end{pmatrix} \xrightarrow{R_2-3R_1} \begin{pmatrix}1 & 2 & 0\\0 & 0 & 0\end{pmatrix} \tag{6}$$

$$\mathbf{n} = \begin{pmatrix}-2\\1\end{pmatrix} \tag{7}$$

Equation of a Line is

$$\mathbf{n}^T\mathbf{x} = c \tag{8}$$

$$\begin{pmatrix}-2 & 1\end{pmatrix}\begin{pmatrix}1\\2\end{pmatrix} = c \tag{9}$$

$$c = 0 \tag{10}$$

$$\begin{pmatrix}-2 & 1\end{pmatrix}\mathbf{x} = 0 \tag{11}$$

$$-2x + y = 0 \tag{12}$$

$$\boxed{y = 2x} \tag{13}$$

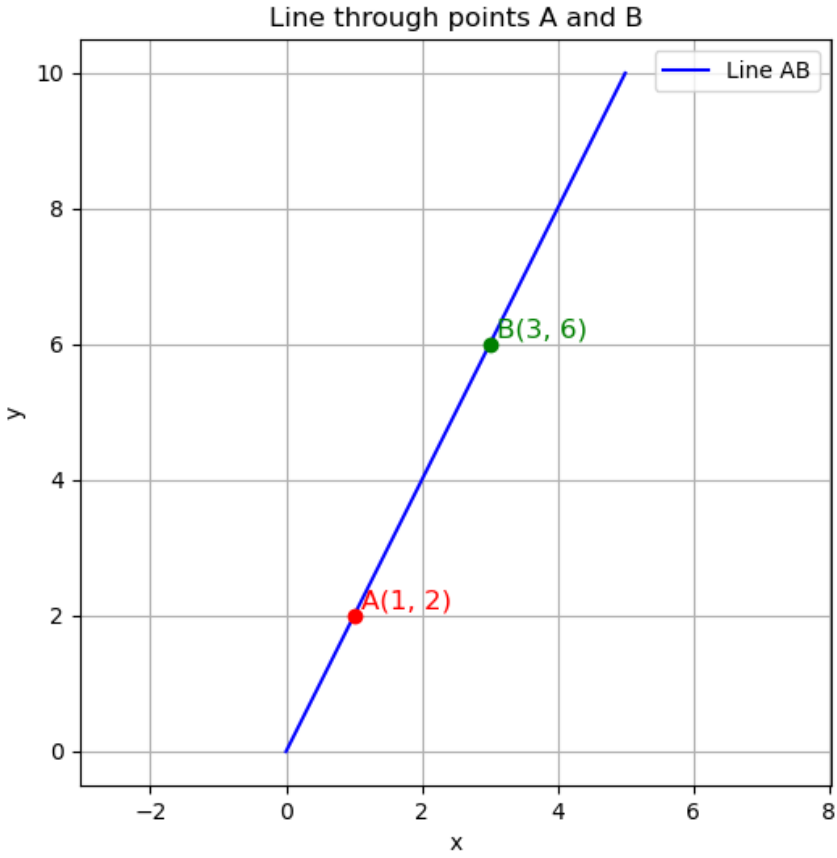

Figure 1: Caption