

Question: 12.10.4.12

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1 PROBLEM

Find the equation of line passing through the points $\begin{pmatrix} -1 \\ 1 \end{pmatrix}$ and $\begin{pmatrix} 2 \\ -4 \end{pmatrix}$

2 SOLUTION

$$\mathbf{A} = \begin{pmatrix} -1 \\ 1 \end{pmatrix} \quad (2.0.1)$$

$$\mathbf{B} = \begin{pmatrix} 2 \\ -4 \end{pmatrix} \quad (2.0.2)$$

$$(2.0.3)$$

Direction vector,

$$\mathbf{m} = \mathbf{A} - \mathbf{B} \quad (2.0.4)$$

$$= \begin{pmatrix} -3 \\ 5 \end{pmatrix} \quad (2.0.5)$$

Normal vector,

$$\mathbf{n} = \begin{pmatrix} 5 \\ 3 \end{pmatrix} \quad (2.0.6)$$

Equation of line is,

$$\mathbf{n}^T \mathbf{x} = c \quad (2.0.7)$$

$$\begin{pmatrix} 5 \\ 3 \end{pmatrix}^T \mathbf{x} = c \quad (2.0.8)$$

Point \mathbf{A} lies on the line,

$$\begin{pmatrix} 5 \\ 3 \end{pmatrix}^T \begin{pmatrix} -1 \\ 1 \end{pmatrix} = c \quad (2.0.9)$$

$$\Rightarrow c = -2 \quad (2.0.10)$$

\therefore the equation of given line is

$$\begin{pmatrix} 5 \\ 3 \end{pmatrix}^T (\mathbf{x}) = -2 \quad (2.0.11)$$

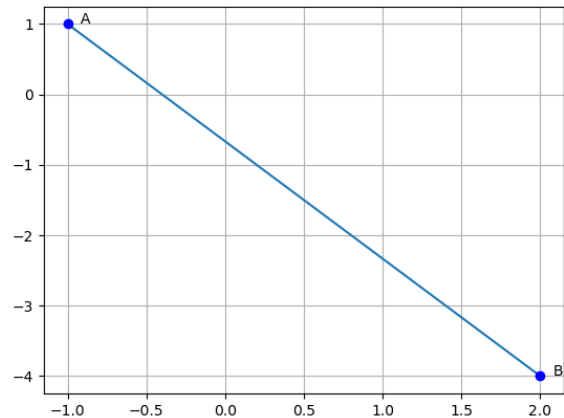


Fig. 0: Line joining points A and B