

Solution to 1.1.5

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Question: The normal form of equation of AB is

$$\mathbf{n}^\top(\mathbf{x} - \mathbf{A}) = 0 \quad (1)$$

where

$$\mathbf{n}^\top \mathbf{m} = \mathbf{n}^\top(\mathbf{B} - \mathbf{A}) \quad (2)$$

Find the normal form of the equation of AB.

Given:

$$\mathbf{A} = \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad (3)$$

$$\mathbf{B} = \begin{pmatrix} -4 \\ 6 \end{pmatrix} \quad (4)$$

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

Solution:
for AB:

$$\mathbf{m} = \mathbf{B} - \mathbf{A} \quad (6)$$

$$= \begin{pmatrix} -4 - 1 \\ 6 + 1 \end{pmatrix} \quad (7)$$

$$= \begin{pmatrix} -5 \\ 7 \end{pmatrix} \quad (8)$$

we have to find \mathbf{n}^\top such that,

$$\Rightarrow \mathbf{n}^\top \mathbf{m} = 0 \quad (9)$$

$$\Rightarrow \mathbf{n}^\top = (7 \ 5) \quad (10)$$

normal form of equation of line AB:

$$\Rightarrow \mathbf{n}^\top(\mathbf{x} - \mathbf{A}) = 0 \quad (11)$$

$$\Rightarrow \mathbf{n}^\top \mathbf{x} = \mathbf{n}^\top \mathbf{A} \quad (12)$$

$$\Rightarrow \mathbf{n}^\top \mathbf{x} = (7 \ 5) \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad (13)$$

$$\Rightarrow (7 \ 5) \mathbf{x} = 2 \quad (14)$$

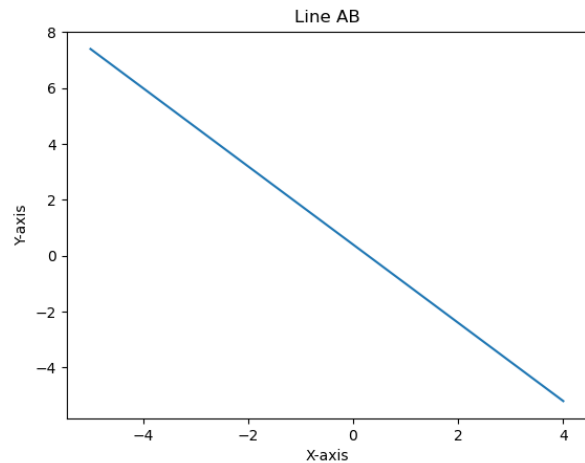


Fig. 0. Line AB