

Assignment 1

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Solution for Problem 1.1.1

Problem Statement

Given triangle with vertices

$$\mathbf{A} = \begin{pmatrix} 1 \\ -1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} -4 \\ 6 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} -3 \\ -5 \end{pmatrix} \quad (1)$$

The direction vector of AB is defined as

$$\mathbf{B} - \mathbf{A} \quad (2)$$

Find the direction vectors of AB , BC and CA .

Solution

Given

$$\mathbf{A} = \begin{pmatrix} 1 \\ -1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} -4 \\ 6 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} -3 \\ -5 \end{pmatrix} \quad (3)$$

The direction vector of AB

$$= \mathbf{B} - \mathbf{A} \quad (4)$$

$$= \begin{pmatrix} -4 \\ 6 \end{pmatrix} - \begin{pmatrix} 1 \\ -1 \end{pmatrix} \quad (5)$$

$$= \begin{pmatrix} -5 \\ 7 \end{pmatrix} \quad (6)$$

The direction vector of BC

$$= \mathbf{C} - \mathbf{B} \quad (7)$$

$$= \begin{pmatrix} -3 \\ 5 \end{pmatrix} - \begin{pmatrix} -4 \\ 6 \end{pmatrix} \quad (8)$$

$$= \begin{pmatrix} 1 \\ -11 \end{pmatrix} \quad (9)$$

The direction vector of CA

$$= \mathbf{A} - \mathbf{C} \quad (10)$$

$$= \begin{pmatrix} 1 \\ -1 \end{pmatrix} - \begin{pmatrix} -3 \\ -5 \end{pmatrix} \quad (11)$$

$$= \begin{pmatrix} 4 \\ 4 \end{pmatrix} \quad (12)$$