Assignment 1

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Solution for Problem 1.1.1

Problem Statement
Given triangle with vertices

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

The direction vector of AB is defined as

$$\mathbf{B} - \mathbf{A} \tag{2}$$

Find the direction vectors of AB, BC and CA.

Given

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

The direction vector of AB

$$= \mathbf{B} - \mathbf{A} \tag{4}$$

$$= \begin{pmatrix} -4 \\ 6 \end{pmatrix} - \begin{pmatrix} 1 \\ -1 \end{pmatrix} \tag{5}$$

$$= \begin{pmatrix} -5 \\ 7 \end{pmatrix} \tag{6}$$

The direction vector of BC

$$= \mathbf{C} - \mathbf{B} \tag{7}$$

$$= \begin{pmatrix} -3 \\ 5 \end{pmatrix} - \begin{pmatrix} -4 \\ 6 \end{pmatrix} \tag{8}$$

$$= \begin{pmatrix} 1 \\ -11 \end{pmatrix} \tag{9}$$

The direction vector of CA

$$= \mathbf{A} - \mathbf{C} \tag{10}$$

$$= \begin{pmatrix} 1 \\ -1 \end{pmatrix} - \begin{pmatrix} -3 \\ -5 \end{pmatrix} \tag{11}$$

$$= \begin{pmatrix} 4 \\ 4 \end{pmatrix} \tag{12}$$