Problem 1.4.1

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question :the equation of the perpendicular bisector of**BC** is

$(\mathbf{x} - \frac{\mathbf{B+C}}{\mathbf{2}})(\mathbf{B} - \mathbf{C}) = 0$

Substitute numerical values and find the equations of the perpendicular bisectors of **AB**,**BC** and **CA**.

Solution: : as given in the question

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

1) the equation of perpendicular bisector of **AB** is :

$$(\mathbf{x} - \frac{\mathbf{B+A}}{\mathbf{2}})(\mathbf{A} - \mathbf{B}) = 0 \tag{1}$$

$$\frac{\mathbf{B+A}}{\mathbf{2}} = \begin{pmatrix} \frac{-3}{2} \\ \frac{5}{2} \end{pmatrix} \tag{2}$$

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} 5 \\ -7 \end{pmatrix} \tag{3}$$

$$(\mathbf{x} - \begin{pmatrix} \frac{-3}{2} \\ \frac{5}{2} \end{pmatrix})(\begin{pmatrix} 5 \\ -7 \end{pmatrix}) = 0 \tag{4}$$

2) the equation of perpendicular bisector of **BC** is :

$$(\mathbf{x} - \frac{\mathbf{B+C}}{\mathbf{2}})(\mathbf{B} - \mathbf{C}) = 0 \tag{5}$$

$$\frac{\mathbf{B+C}}{\mathbf{2}} = \begin{pmatrix} \frac{-7}{2} \\ \frac{1}{2} \end{pmatrix} \tag{6}$$

$$\mathbf{B} - \mathbf{C} = \begin{pmatrix} -1 \\ 11 \end{pmatrix} \tag{7}$$

$$(\mathbf{x} - \begin{pmatrix} \frac{-7}{2} \\ \frac{1}{2} \end{pmatrix})(\begin{pmatrix} -1 \\ 11 \end{pmatrix}) = 0 \tag{8}$$

3) the equation of perpendicular bisector of **CA** is :

$$(\mathbf{x} - \frac{\mathbf{A+C}}{\mathbf{2}})(\mathbf{C} - \mathbf{A}) = 0 \tag{9}$$

$$\frac{\mathbf{A+C}}{\mathbf{2}} = \begin{pmatrix} \frac{-1}{2} \\ -3 \end{pmatrix} \tag{10}$$

$$\mathbf{C} - \mathbf{A} = \begin{pmatrix} -4 \\ -4 \end{pmatrix} \tag{11}$$

$$(\mathbf{x} - \begin{pmatrix} -1 \\ -3 \end{pmatrix})(\begin{pmatrix} -4 \\ -4 \end{pmatrix}) = 0 \tag{12}$$