Problem 1.1.5

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The normal equation for the side BC is

$$\mathbf{n}^\top \left(\mathbf{x} - \mathbf{B}\right) = 0 \tag{1}$$

$$\mathbf{n}^\top \mathbf{x} = \mathbf{n}^\top \mathbf{B} \tag{2}$$

Now our task is to find the $\mathbf{n}$ so that we can find $\mathbf{n}^\top$
As given in the question

$$\mathbf{n} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \mathbf{m} \tag{3}$$

here $\mathbf{m} = \mathbf{C} - \mathbf{B}$ for side $\mathbf{BC}$

$$\implies \mathbf{m} = \begin{pmatrix} -3 \\ -5 \end{pmatrix} - \begin{pmatrix} -4 \\ 6 \end{pmatrix} \tag{4}$$

$$\implies \mathbf{m} = \begin{pmatrix} 1 \\ -11 \end{pmatrix} \tag{5}$$

now we as we have obtained vector $\mathbf{m}$
we can use this to obtain vector $\mathbf{n}$

$$\mathbf{n} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} 1 \\ -11 \end{pmatrix} \tag{6}$$

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

The transpose of $\mathbf{n}$ is

$$\mathbf{n}^\top = \begin{pmatrix} -11 & -1 \end{pmatrix} \tag{8}$$

hence the normal equation of side BC is

$$\begin{pmatrix} -11 & -1 \end{pmatrix} \mathbf{x} = \begin{pmatrix} -11 & -1 \end{pmatrix} \begin{pmatrix} -4 \\ 6 \end{pmatrix} \tag{9}$$

$$\begin{pmatrix} -11 & -1 \end{pmatrix} \mathbf{x} = 38 \tag{10}$$