Solution to 1.1.2

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Question: The length of side *BC* is

$$\|\mathbf{B} - \mathbf{A}\| \triangleq \sqrt{(\mathbf{B} - \mathbf{A})^\top \mathbf{B} - \mathbf{A}} \qquad (1)$$

where

$$\mathbf{A}^\top \triangleq \begin{pmatrix} 1 & -1 \end{pmatrix} \qquad (2)$$

Solution: Given:

$$\mathbf{B} = \begin{pmatrix} -4 \\ 6 \end{pmatrix} \qquad (3)$$

$$\mathbf{C} = \begin{pmatrix} -3 \\ -5 \end{pmatrix} \qquad (4)$$

$$\|\mathbf{B} - \mathbf{C}\| = \sqrt{(\mathbf{B} - \mathbf{C})^\top \mathbf{B} - \mathbf{C}} \qquad (5)$$

Now,

$$\mathbf{B} - \mathbf{C} = \begin{pmatrix} -1 \\ 11 \end{pmatrix} \qquad (6)$$

$$(\mathbf{B} - \mathbf{C})^\top = \begin{pmatrix} -1 & 11 \end{pmatrix} \qquad (7)$$

$$\|\mathbf{B} - \mathbf{C}\| = \sqrt{\begin{pmatrix} -1 & 11 \end{pmatrix}\begin{pmatrix} -1 \\ 11 \end{pmatrix}} \qquad (8)$$

$$= \sqrt{122} \qquad (9)$$