

Question: 12.10.3.15

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1 PROBLEM

If the vertices A, B, C of a triangle ABC are $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\begin{pmatrix} -1 \\ 0 \\ 0 \end{pmatrix}$ and $\begin{pmatrix} 0 \\ 1 \\ 2 \end{pmatrix}$ respectively, then find $\angle ABC$.

2 SOLUTION

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} 2 \\ 2 \\ 3 \end{pmatrix} \quad (2.0.1)$$

$$\mathbf{C} - \mathbf{B} = \begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix} \quad (2.0.2)$$

$$\angle ABC = \cos^{-1} \frac{(\mathbf{A} - \mathbf{B})^T (\mathbf{C} - \mathbf{B})}{\|\mathbf{A} - \mathbf{B}\| \|\mathbf{C} - \mathbf{B}\|} \quad (2.0.3)$$

$$= \cos^{-1} \frac{10}{\sqrt{102}} \quad (2.0.4)$$

$$= 8.05^\circ \quad (2.0.5)$$