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

$$\mathbf{A}-\mathbf{B} = \begin{pmatrix}2\\2\\3\end{pmatrix} \tag{2.0.1}$$

$$\mathbf{C}-\mathbf{B} = \begin{pmatrix}1\\1\\2\end{pmatrix} \tag{2.0.2}$$

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

$$= \cos^{-1}\frac{10}{\sqrt{102}} \tag{2.0.4}$$

$$= 8.05^\circ \tag{2.0.5}$$

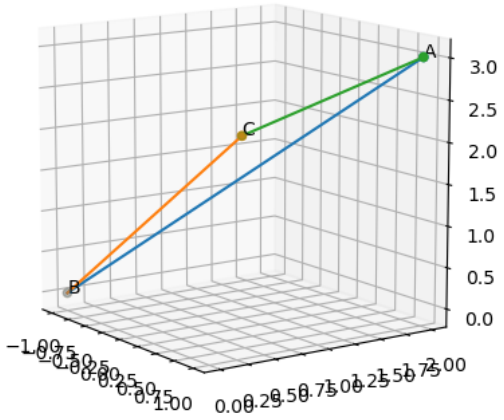

Fig. 0: Triangle ABC