## Question: 12.10.3.15

## Nikam Pratik Balasaheb (EE21BTECH11037)

## 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

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

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

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

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

$$= 8.05^{\circ}$$
(2.0.3)
(2.0.4)

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

$$= 8.05^{\circ}$$
 (2.0.5)

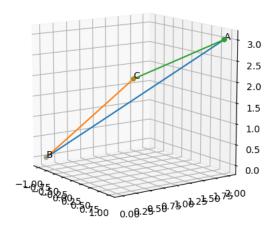


Fig. 0: Triangle ABC