Assignment 1

Priyanka - EE21MTECH12002

Download all python codes from

https://github.com/PeriPriyanka/Vectors_ass/Assignment1/code

and latex-tikz codes from

https://github.com/PeriPriyanka/Vectors_ass/Assignment1

1 Problem

(vectors 2.6) Are the points form the verices of Right Angle Triangle?

$$\mathbf{A} = \begin{pmatrix} 3 \\ 6 \\ 9 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 10 \\ 20 \\ 30 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 25 \\ -41 \\ 5 \end{pmatrix} \tag{1.0.1}$$

2 Solution

Consider the given vectors A,B,C

$$\mathbf{A} = \begin{pmatrix} 3 \\ 6 \\ 9 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 10 \\ 20 \\ 30 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 25 \\ -41 \\ 5 \end{pmatrix} \tag{2.0.1}$$

Checking the orthogonality condition at all the three vertices A,B,C.
Condition at A:

$$(\mathbf{B}-\mathbf{A})^T(\mathbf{C}-\mathbf{A}) = \begin{pmatrix} 7 & 14 & 21 \end{pmatrix} \begin{pmatrix} 22 \\ -47 \\ -4 \end{pmatrix} \tag{2.0.2}$$

$$= -588 \neq 0 \tag{2.0.3}$$

Condition at B:

$$(\mathbf{A}-\mathbf{B})^T(\mathbf{C}-\mathbf{B}) = \begin{pmatrix} -7 & -14 & -21 \end{pmatrix} \begin{pmatrix} 15 \\ -61 \\ -25 \end{pmatrix} \tag{2.0.4}$$

$$= 1274 \neq 0 \tag{2.0.5}$$

Condition at C:

$$(\mathbf{A}-\mathbf{C})^T(\mathbf{B}-\mathbf{C}) = \begin{pmatrix} -22 & 47 & 4 \end{pmatrix} \begin{pmatrix} -15 \\ 61 \\ 25 \end{pmatrix} \tag{2.0.6}$$

$$= 3297 \neq 0 \tag{2.0.7}$$

Orthogonality Test fails at all the vertices of the $\triangle ABC$
Therefore, $\triangle ABC$ is not a Right angle triangle.
$\triangle ABC$ is shown in the Fig0

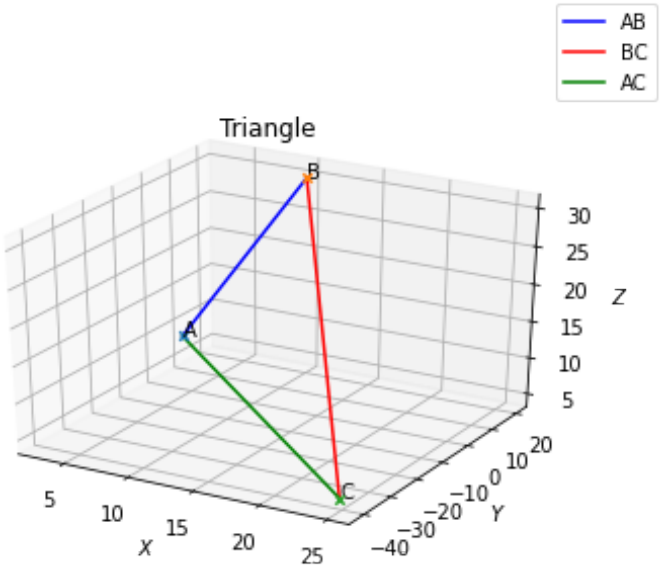

Fig. 0: Plot of the Triangle.