BASICS OF PROGRAMMING ASSIGNMENT - 1

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CHAPTER II EX-II Q.3-II

Showing That the following triads of points form right angled triangles or Not:

$$\mathbf{A} = \begin{pmatrix} 2 \\ 2 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 6 \\ 3 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 4 \\ 11 \end{pmatrix} \tag{1}$$

SOLUTION

Pythagoras Theorem:=

$$Hypotenuse^2 = Base^2 + Height^2 \tag{2}$$

$$\|\mathbf{A}-\mathbf{B}\|^2 = (\mathbf{A}-\mathbf{B})^T(\mathbf{A}-\mathbf{B})$$

$$\mathbf{A}-\mathbf{B} = \begin{pmatrix} 2-6 \\ 2-3 \end{pmatrix} = \begin{pmatrix} -4 \\ -1 \end{pmatrix}$$

$$\|\mathbf{A}-\mathbf{B}\| = \sqrt{(-4)^2+(-1)^2} = 4.1231 \tag{3}$$

$$\|\mathbf{B}-\mathbf{C}\|^2 = (\mathbf{B}-\mathbf{C})^T(\mathbf{B}-\mathbf{C})$$

$$\mathbf{B}-\mathbf{C} = \begin{pmatrix} 6-4 \\ 3-11 \end{pmatrix} = \begin{pmatrix} 2 \\ -8 \end{pmatrix}$$

$$\|\mathbf{B}-\mathbf{C}\| = \sqrt{(2)^2+(-8)^2} = 8.2462 \tag{4}$$

$$\|\mathbf{A}-\mathbf{C}\|^2 = (\mathbf{A}-\mathbf{C})^T(\mathbf{A}-\mathbf{C})$$

$$\mathbf{A}-\mathbf{C} = \begin{pmatrix} 2-4 \\ 2-11 \end{pmatrix} = \begin{pmatrix} 2 \\ -9 \end{pmatrix}$$

$$\|\mathbf{A}-\mathbf{C}\| = \sqrt{(2)^2+(9)^2} = 9.2195 \tag{5}$$

Maximum length is Hypotenuse

$$Hypotenuse(AC) = 9.2195 \tag{6}$$

$$Base(AB) = 4.1231 \tag{7}$$

$$Height(BC) = 8.2462 \tag{8}$$

Now To be An Right Angled Triangle:

$$AC^2 = AB^2 + BC^2 \tag{9}$$

Here I Can See:

$$9.2195^2 = 4.1231^2 + 8.2462^2 \tag{10}$$

So I Can Say That These Three Points(A,B,C) forming Right Angled Triangle

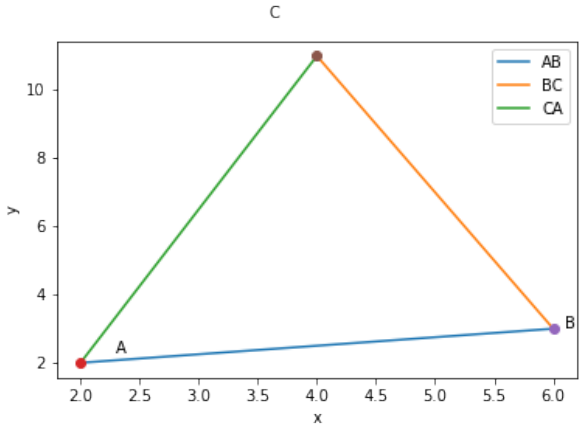

Fig. 0: Triangle