

Assignment 1

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Find Python Codes from below link

<https://github.com/praneeth2720/Assignment-1/blob/main/vectors.py>

and latex codes from

<https://github.com/praneeth2720/Assignment-1>

1 CBSE 10TH 2008 PAPER.

1.1 Question 22

The mid-points of the side of triangle are (3,4) ,(4,6) and (5,7). Find the coordinates of the vertices of the triangle.

1.2 Solution

Let the mid points of the sides of triangle are

$$P = \begin{pmatrix} 3 \\ 4 \end{pmatrix} \quad Q = \begin{pmatrix} 4 \\ 6 \end{pmatrix} \quad R = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$$

Let us assume coordinates of the vertices of triangle as

A B C

By using section formula

$$\frac{A+B}{2} = P \quad (1.2.1)$$

$$\frac{B+C}{2} = Q \quad (1.2.2)$$

$$\frac{A+C}{2} = R \quad (1.2.3)$$

$$(1.2.4)$$

$$A+B=2P \quad (1.2.5)$$

$$B+C=2Q \quad (1.2.6)$$

$$A+C=2R \quad (1.2.7)$$

$$(1.2.8)$$

Let us consider the above three equations as

$$\text{And } \begin{pmatrix} I & I & 0 \\ 0 & I & I \\ I & 0 & I \end{pmatrix} \text{ as } T$$

$$\begin{pmatrix} I & I & 0 \\ 0 & I & I \\ I & 0 & I \end{pmatrix} \begin{pmatrix} A \\ B \\ C \end{pmatrix} = 2 \begin{pmatrix} P \\ Q \\ R \end{pmatrix} \quad (1.2.9)$$

now multiplying each side with T^{-1} we get

$$\begin{pmatrix} A \\ B \\ C \end{pmatrix} = 2 \frac{1}{2} \begin{pmatrix} 1 & 1 & -1 \\ -1 & 1 & 1 \\ 1 & -1 & 1 \end{pmatrix} \begin{pmatrix} P \\ Q \\ R \end{pmatrix} \quad (1.2.10)$$

$$\begin{pmatrix} A \\ B \\ C \end{pmatrix} = \begin{pmatrix} P & Q & -R \\ -P & Q & R \\ P & -Q & R \end{pmatrix} \quad (1.2.11)$$

$$\begin{pmatrix} A \\ B \\ C \end{pmatrix} = \begin{pmatrix} \begin{pmatrix} 4 \\ 5 \end{pmatrix} \\ \begin{pmatrix} 2 \\ 3 \end{pmatrix} \\ \begin{pmatrix} 6 \\ 9 \end{pmatrix} \end{pmatrix} \quad (1.2.12)$$

\therefore

by comparing rows of each side we get the vertices of triangle. The

$$A = \begin{pmatrix} 4 \\ 5 \end{pmatrix} \quad B = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad C = \begin{pmatrix} 6 \\ 9 \end{pmatrix}$$

