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 pints of the sides of triangle are
P=$\begin{pmatrix}3\\4\end{pmatrix}$ Q=$\begin{pmatrix}4\\6\end{pmatrix}$ R=$\begin{pmatrix}5\\7\end{pmatrix}$
Let assume coordintes of the vertices of triangle as A B C

By using section formula

$$\frac{A+B}{2} = \text{P} \tag{1.2.1}$$
$$\frac{B+C}{2} = \text{Q} \tag{1.2.2}$$
$$\frac{A+C}{2} = \text{R} \tag{1.2.3}$$
$$\tag{1.2.4}$$

$$A+B = 2\text{P} \tag{1.2.5}$$
$$B+C = 2\text{Q} \tag{1.2.6}$$
$$A+C = 2\text{R} \tag{1.2.7}$$
$$\tag{1.2.8}$$

Let us consider the above three equations as
And $\begin{pmatrix}I & I & 0\\0 & I & I\\I & 0 & I\end{pmatrix}$ as T

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

now multiplying each side with T^{-1} *weget*

$$\begin{pmatrix}A\\B\\C\end{pmatrix} = 2\,\frac{1}{2}\begin{pmatrix}1 & 1 & -1\\-1 & 1 & 1\\1 & -1 & 1\end{pmatrix}\begin{pmatrix}P\\Q\\R\end{pmatrix}$$

$$\begin{pmatrix}A\\B\\C\end{pmatrix} = \begin{pmatrix}P+Q-R\\-P+Q+R\\P-Q+R\end{pmatrix} \tag{1.2.10}$$

$$\begin{pmatrix}A\\B\\C\end{pmatrix} = \begin{pmatrix}\begin{pmatrix}4\\5\end{pmatrix}\\\begin{pmatrix}2\\3\end{pmatrix}\\\begin{pmatrix}6\\9\end{pmatrix}\end{pmatrix} \tag{1.2.11}$$

∴by comparing rows of each side we get the vertices of triangle.They are as follows
A=$\begin{pmatrix}4\\5\end{pmatrix}$ B=$\begin{pmatrix}2\\3\end{pmatrix}$ C=$\begin{pmatrix}6\\9\end{pmatrix}$