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

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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

$\mathbf{X}_1 = \begin{pmatrix}3\\4\end{pmatrix}$ $\mathrm{X}_2 = \begin{pmatrix}4\\6\end{pmatrix}$ $\mathrm{X}_3 = \begin{pmatrix}5\\7\end{pmatrix}$

Let assume coordintes of the vertices of triangle as

$\mathbf{A}_1 = \begin{pmatrix}X_1\\Y_1\end{pmatrix}$ $\mathrm{B}_1 = \begin{pmatrix}X_2\\Y_2\end{pmatrix}$ $\mathrm{C}_1 = \begin{pmatrix}X_3\\Y_3\end{pmatrix}$

By using section formula

$$\mathrm{X}_1 = \frac{A+B}{2} \tag{1.2.1}$$

$$\mathrm{X}_2 = \frac{B+C}{2} \tag{1.2.2}$$

$$\mathrm{X}_3 = \frac{A+C}{2} \tag{1.2.3}$$

(1.2.4)

$$\begin{pmatrix}3\\4\end{pmatrix} = \frac{1}{2}\begin{pmatrix}x_1+x_2\\y_1+y_2\end{pmatrix} \tag{1.2.5}$$

$$\begin{pmatrix}4\\6\end{pmatrix} = \frac{1}{2}\begin{pmatrix}x_2+x_3\\y_2+y_3\end{pmatrix} \tag{1.2.6}$$

$$\begin{pmatrix}5\\7\end{pmatrix} = \frac{1}{2}\begin{pmatrix}x_1+x_3\\y_1+y_3\end{pmatrix} \tag{1.2.7}$$

(1.2.8)

Now equating 1^{st} row of matrices in each side we get

$$\mathrm{x}_1+\mathrm{x}_2 = 6 \tag{1.2.9}$$

$$\mathrm{x}_2+\mathrm{x}_3 = 8 \tag{1.2.10}$$

$$\mathrm{x}_1+\mathrm{x}_3 = 10 \tag{1.2.11}$$

(1.2.12)

solving these three equations we get

$\mathbf{x}_1 = 4, \mathrm{x}_2 = 2, \mathrm{x}_3 = 6.$

Now equating 2^{ND} row of matrices in each side we get

$$\mathrm{y}_1+\mathrm{Y}_2 = 8 \tag{1.2.13}$$

$$\mathrm{y}_2+\mathrm{Y}_3 = 12 \tag{1.2.14}$$

$$\mathrm{y}_1+\mathrm{Y}_3 = 14 \tag{1.2.15}$$

(1.2.16)

solving these three equations we get

$\mathbf{y}_1 = 5, \mathrm{y}_2 = 3, \mathrm{y}_3 = 9.$

$\therefore$the vertices of the triangle are

$\mathbf{A}_1 = \begin{pmatrix}4\\5\end{pmatrix}$ $\mathrm{B}_1 = \begin{pmatrix}2\\3\end{pmatrix}$ $\mathrm{C}_1 = \begin{pmatrix}6\\9\end{pmatrix}$