Assignment 2

Rahul Bingumalla
SM21MTECH12008

1 Chapter III, Miscellaneous Examples VI, Q.7

If $\begin{pmatrix} a \\ b \end{pmatrix}$,$\begin{pmatrix} c \\ d \end{pmatrix}$ are opposite vertices of parallelogram , and $\begin{pmatrix} c \\ b \end{pmatrix}$ is a third vertex ,find the co-ordinates of fourth vertex.

1.1 Solution

Let the given points be

$$\mathbf{A} = \begin{pmatrix} a \\ b \end{pmatrix} \; ; \; \mathbf{B} = \begin{pmatrix} c \\ d \end{pmatrix}; \; \mathbf{C} = \begin{pmatrix} c \\ b \end{pmatrix} \; ; \tag{1.1.1}$$

let D be forth vertex $\mathrm{D} = \begin{pmatrix} x \\ y \end{pmatrix}$

(1.1.2)

In parallelogram the mid point of diagonal joining opposite points **A**,**B** & **C**,**D** are same.

Midpoint of **AB** is $\begin{pmatrix} \frac{a+c}{2} \\ \frac{b+d}{2} \end{pmatrix}$

(1.1.3)

Midpoint of **CD** is $\begin{pmatrix} \frac{c+x}{2} \\ \frac{b+y}{2} \end{pmatrix}$

(1.1.4)

Midpoint of **AB** = Midpoint of**CD**

$$\begin{pmatrix} \frac{a+c}{2} \\ \frac{b+d}{2} \end{pmatrix} = \begin{pmatrix} \frac{c+x}{2} \\ \frac{b+y}{2} \end{pmatrix} \tag{1.1.5}$$

(1.1.6)

from above (1.1.5)

$$(a + c)/2 = (c + x)/2 \tag{1.1.7}$$

$$x = a \tag{1.1.8}$$

$$(b + d)/2 = (b + y)/2 \tag{1.1.9}$$

$$y = d \tag{1.1.10}$$

(1.1.11)

Therefore fourth vertex of parallelogram is $\begin{pmatrix} x \\ y \end{pmatrix}$=$\begin{pmatrix} a \\ d \end{pmatrix}$

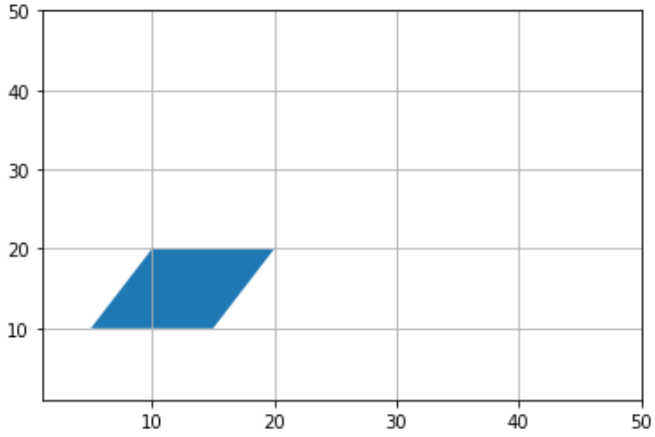

Fig. 1.1: example parallelogram plotted on xy plane