1-1.3-2

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Question:
The coordinates of the three consecutive vertices of a parallelogram $ABCD$ are A (1,3),B(-1,2), and C(2,5).Find the coordinates of the fourth vertex D. (10,2021)

Sol:

Label	Coordinate
A	(1,3)
B	(-1,2)
C	(2,5)
D	(x,y)

TABLE 0: Variables Used

Given $A=\begin{pmatrix}1\\3\end{pmatrix}$, $B=\begin{pmatrix}-1\\2\end{pmatrix}$, and $C=\begin{pmatrix}2\\5\end{pmatrix}$
Let D be $\begin{pmatrix}x\\y\end{pmatrix}$
In a parallelogram $A-B=D-C$
So,

$$A-B=\begin{pmatrix}1\\3\end{pmatrix}-\begin{pmatrix}-1\\2\end{pmatrix}=\begin{pmatrix}2\\1\end{pmatrix} \tag{0.1}$$

$$D-C=\begin{pmatrix}x-2\\y-5\end{pmatrix} \tag{0.2}$$

Comparing both,

$$\begin{pmatrix}2\\1\end{pmatrix}=\begin{pmatrix}x-2\\y-5\end{pmatrix} \tag{0.3}$$

Solving for x and y,
we get x=4 and y=6
Hence $D=\begin{pmatrix}4\\6\end{pmatrix}$

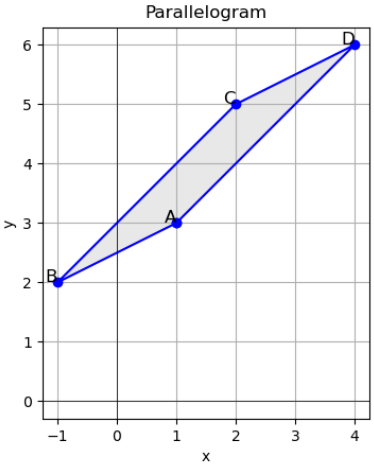

Fig. 0.1: parallelogram ABCD