1-1.3-2

AI24BTECH11017-Maanya Sri

Question:
The coordinates of the three consecutive vertices of a parallelogram *ABCD* are $\mathbf{A}(1,3), \mathbf{B}(-1,2)$, and $\mathbf{C}(2,5)$.Find the coordinates of the fourth vertex **D**. (10,2021) **Sol:**
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 , midpoints of diagonals are same .
Therefore midpoint of AC and BD is the same.
Midpoint of $AC=\begin{pmatrix}\frac{1+2}{2}\\\frac{3+5}{2}\end{pmatrix}=\begin{pmatrix}\frac{3}{2}\\4\end{pmatrix}$
Midpoint of $BD=\begin{pmatrix}\frac{-1+x}{2}\\\frac{2+y}{2}\end{pmatrix}$
Now equating both the midpoints,we get
$\begin{pmatrix}\frac{3}{2}\\4\end{pmatrix}=\begin{pmatrix}\frac{-1+x}{2}\\\frac{2+y}{2}\end{pmatrix}$
Solving for x and y we get x=4 and y=6 Hence $D=\begin{pmatrix}4\\6\end{pmatrix}$