1.3.2

AI25BTECH11023 - Pratik R

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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**.

Solution:
Given that

$$\mathbf{A} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}.$$

The coordinates of *D* of parallelogram *ABCD* are obtained by equating midpoint of parallelogram:

$$\frac{\mathbf{D} + \mathbf{B}}{2} = \frac{\mathbf{A} + \mathbf{C}}{2} \tag{0.1}$$

$$\mathbf{D} = \mathbf{A} + \mathbf{C} - \mathbf{B} \tag{0.2}$$

$$\mathbf{D} = \begin{pmatrix} 1 \\ 3 \end{pmatrix} + \begin{pmatrix} 2 \\ 5 \end{pmatrix} - \begin{pmatrix} -1 \\ 2 \end{pmatrix} \tag{0.3}$$

$$\mathbf{D} = \begin{pmatrix} 4 \\ 6 \end{pmatrix} \tag{0.4}$$