

## 1.3.2

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**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  $\mathbf{D}$ .

**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:

$$\frac{\mathbf{D} + \mathbf{B}}{2} = \frac{\mathbf{A} + \mathbf{C}}{2} \quad (0.1)$$

$$\mathbf{D} = \mathbf{A} + \mathbf{C} - \mathbf{B} \quad (0.2)$$

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

$$\mathbf{D} = \begin{pmatrix} 4 \\ 6 \end{pmatrix} \quad (0.4)$$

