

Question-1-1.6-8

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Question:

If the three points **A** $(x, -1)$, **B** $(2, 1)$, **C** $(4, 5)$ are collinear, find the value of x

Solution:

point	Coordinates
A	$(x, -1)$
B	$(2, 1)$
C	$(4, 5)$

TABLE 0: variables used

A, B, C are collinear if

$$\text{rank}(\mathbf{B} - \mathbf{C} \quad \mathbf{C} - \mathbf{A}) = 1 \quad (0.1)$$

$$\begin{pmatrix} -2 & 4-x \\ -4 & 6 \end{pmatrix} \xleftrightarrow{R2 \leftarrow 2R1 - R2} \begin{pmatrix} -2 & 4-x \\ 0 & 2-2x \end{pmatrix} \quad (0.2)$$

As rank of matrix is 1

$$2 - 2x = 0 \quad (0.3)$$

$$\implies x = 1 \quad (0.4)$$

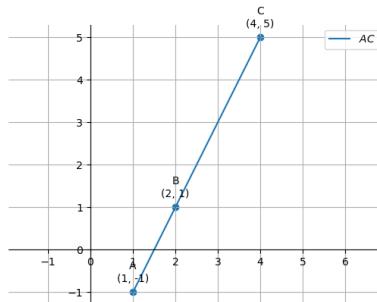


Fig. 0.1: Line **AC**