

Assignment - 1

Saiteja Chandragiri
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Abstract—This is a simple document to learn about vectors, matrices and constructions using latex, draw figures using Python, Latex.

Download all python and latex-tikz codes from

svn co <https://github.com/Chandragirisaitaja/assignment-1.git>

1 VECTORS

CBSE-MATH-10-2008-QP-MATH-X-2008-30-2-2-Q.19

1.1. Find a relation between x and y if the points

$\mathbf{A} = \begin{pmatrix} x \\ y \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$ and $\mathbf{C} = \begin{pmatrix} 7 \\ 0 \end{pmatrix}$ are collinear.

Solution: Let

$$\mathbf{x} = \begin{pmatrix} x \\ y \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \text{ and } \mathbf{C} = \begin{pmatrix} 7 \\ 0 \end{pmatrix} \quad (1.1.1)$$

Then,

$$\mathbf{m} = \mathbf{B} - \mathbf{C} = \begin{pmatrix} -6 \\ 2 \end{pmatrix}, \quad (1.1.2)$$

and

$$\mathbf{n}^T \mathbf{m} = 0 \quad (1.1.3)$$

$$\Rightarrow \mathbf{n}^T \begin{pmatrix} -6 \\ 2 \end{pmatrix} = 0 \Rightarrow \mathbf{n}^T = \begin{pmatrix} 2 & 6 \end{pmatrix} \quad (1.1.4)$$

Equation of line is given by

$$\mathbf{n}^T (\mathbf{x} - \mathbf{B}) = 0 \quad (1.1.5)$$

$$\Rightarrow \mathbf{n}^T \left(\mathbf{x} - \begin{pmatrix} 1 \\ 2 \end{pmatrix} \right) = 0 \quad (1.1.6)$$

$$\begin{pmatrix} 2 & 6 \end{pmatrix} \left(\mathbf{x} - \begin{pmatrix} 1 \\ 2 \end{pmatrix} \right) = 0 \quad (1.1.7)$$

$$\begin{pmatrix} 2 & 6 \end{pmatrix} \mathbf{x} - \begin{pmatrix} 2 & 6 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \end{pmatrix} = 0 \quad (1.1.8)$$

$$\begin{pmatrix} 2 & 6 \end{pmatrix} \mathbf{x} = 14 \quad (1.1.9)$$

is the equation of the desired line.

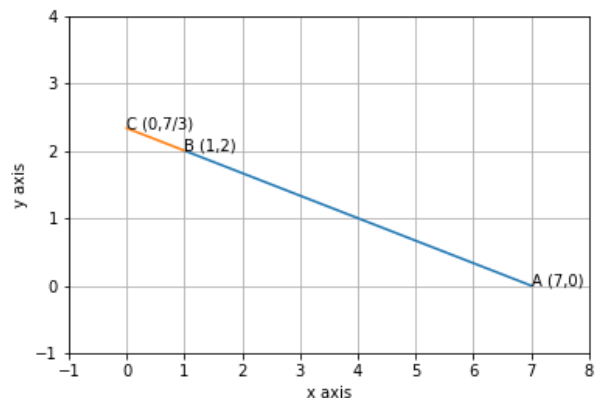


Fig. 1.1. Three points $\mathbf{A}, \mathbf{B}, \mathbf{C}$ are collinear