Line Assignment

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***Abstract*—This document contains the solution to Question 16 of Exercise 3 in Chapter 10 of the class 12 NCERT textbook.**

1) Show that the points $\mathbf{A} = \begin{pmatrix}1\\2\\7\end{pmatrix}$, $\mathbf{B} = \begin{pmatrix}2\\6\\3\end{pmatrix}$, and $\mathbf{C} = \begin{pmatrix}3\\10\\-1\end{pmatrix}$ are collinear.

Solution: The area of $\triangle ABC$ is given by

$$\text{ar}\,(\triangle ABC) = \frac{1}{2}\|(\mathbf{B}-\mathbf{A})\times(\mathbf{C}-\mathbf{A})\| \quad (1)$$

$$= \frac{1}{2}\begin{vmatrix}1 & 1 & 2\\1 & 4 & 8\\1 & -4 & -8\end{vmatrix} = 0 \quad (2)$$

since $2C_2 = C_3$ in (2). This is verified in the Python code `codes/det.py`. Therefore, the given points are collinear.