

# Assignment 2

Pragna Mamidipaka - EE20BTECH11026

Download all latex-tikz codes from

<https://github.com/Pymamid/C-and-Data-Structures/blob/main/Assignment2/Assignment2.tex>

Download all python codes from

<https://github.com/Pymamid/C-and-Data-Structures/blob/main/Assignment2/codes>

## 1 PROBLEM

(Que 2.8) By using the concept of equation of a line, prove that the three points  $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$ ,  $\begin{pmatrix} -2 \\ -2 \end{pmatrix}$  and  $\begin{pmatrix} 8 \\ 2 \end{pmatrix}$  are collinear.

## 2 SOLUTION

To prove that the given points are collinear, we first need to solve for the equation of line passing through the points  $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$  and  $\begin{pmatrix} -2 \\ -2 \end{pmatrix}$ .

If the third point  $\begin{pmatrix} 8 \\ 2 \end{pmatrix}$  satisfies our obtained equation of line, then it is known that the third point  $\begin{pmatrix} 8 \\ 2 \end{pmatrix}$  passes through the line containing the first two points. This in turn proves that all three given points are collinear.

Obtaining the equation of the line:

The line passing through  $\begin{pmatrix} 3 \\ 0 \end{pmatrix}$  and  $\begin{pmatrix} -2 \\ -2 \end{pmatrix}$  can be obtained by:

$$\frac{y - 0}{x - 3} = \frac{-2 - 0}{-2 - 3}$$

$$\Rightarrow -5(y - 0) = -2(x - 3)$$

$$\Rightarrow 2x = 5y + 6$$

The code for the figure can be obtained from:

[https://github.com/Pymamid/C-and-Data-Structures/blob/main/Assignment2/codes/plot\\_line.py](https://github.com/Pymamid/C-and-Data-Structures/blob/main/Assignment2/codes/plot_line.py)

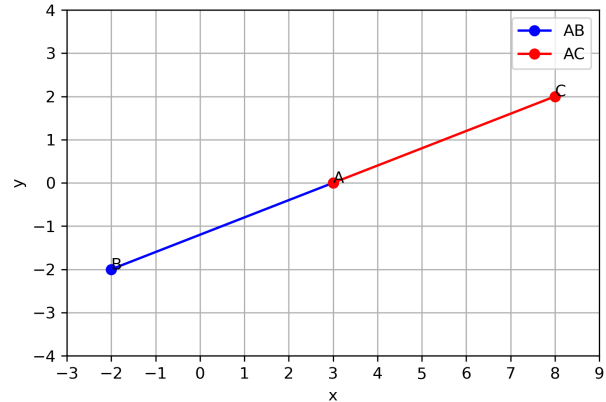


Fig. 0: Line BAC obtained using python

Checking if the point  $\begin{pmatrix} 8 \\ 2 \end{pmatrix}$  satisfies the equation:

We must substitute  $\begin{pmatrix} 8 \\ 2 \end{pmatrix}$  into the equation  $2x = 5y + 6$ .

$$\Rightarrow 2(8) = 5(2) + 6$$

$$\Rightarrow 16 = 16$$

Since LHS = RHS, it proves that the third point  $\begin{pmatrix} 8 \\ 2 \end{pmatrix}$  satisfies the line equation. Hence it is proved that all the three given points are collinear.