1.6.12

EE24BTECH11033 - Kolluru Suraj

Question:
Point $\brak{-4,2}$ lies on the line segment joining the points $\mathbf{A}\brak{-4,6}$ and $\mathbf{B}\brak{-4,-6}$.
Solution:

point	Coordinates
A	$\brak{-4,6}$
B	$\brak{-4,-6}$
C	$\brak{-4,2}$

TABLE 0: variables used

Points $\mathbf{A},\mathbf{B},\mathbf{C}$ are defined to be collinear if

$$\text{rank}\brak{\mathbf{B}-\mathbf{A} \quad \mathbf{C}-\mathbf{A}} = 1 \tag{0.1}$$

$$\mathbf{B}-\mathbf{A} = \myvec{0\\-12} \tag{0.2}$$

$$\mathbf{C}-\mathbf{A} = \myvec{0\\-4} \tag{0.3}$$

The collinearity matrix can be expressed as

$$\myvec{0 & 0\\-12 & -4} \tag{0.4}$$

which is a rank 1 matrix. To find the ratio which $\mathbf{C}$ divides $\mathbf{A},\mathbf{B}$. Using section formula,

$$\myvec{-4\\2} = \frac{\myvec{-4\\6} + k\myvec{-4\\-6}}{1+k} \tag{0.5}$$

$$\implies 2k\myvec{0\\4} = \myvec{0\\4} \tag{0.6}$$

$$\text{or, } k = \frac{1}{2}. \tag{0.7}$$

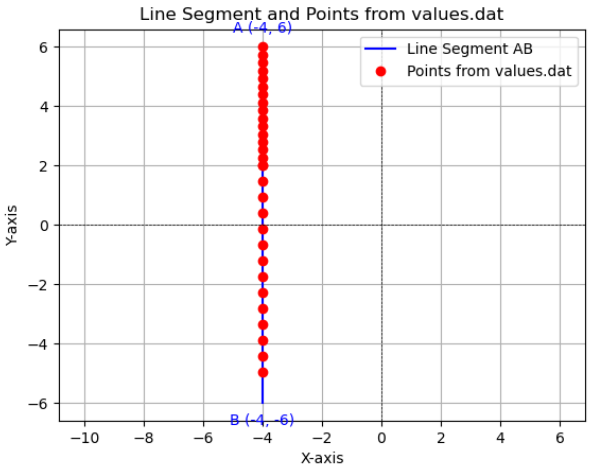

Fig. 0.1: Line connecting ABC