## EE24BTECH11033 - Kolluru Suraj

## **Question:**

Point (-4,2) lies on the line segment joining the points  $\mathbf{A} \begin{pmatrix} -4 \\ 6 \end{pmatrix}$  and  $\mathbf{B} \begin{pmatrix} -4 \\ -6 \end{pmatrix}$ . **Solution:** 

point	Coordinates
A	$\begin{pmatrix} -4 \\ 6 \end{pmatrix}$
В	$\begin{pmatrix} -4 \\ -6 \end{pmatrix}$
C	$\begin{pmatrix} -4 \\ 2 \end{pmatrix}$

TABLE 0: variables used

Points A, B, C are defined to be collinear if

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

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 0 \\ -12 \end{pmatrix} \tag{0.2}$$

$$\mathbf{C} - \mathbf{A} = \begin{pmatrix} 0 \\ -4 \end{pmatrix} \tag{0.3}$$

The collinearity matrix can be expressed as

$$\begin{pmatrix} 0 & 0 \\ -12 & -4 \end{pmatrix} \tag{0.4}$$

which is a rank 1 matrix. To find the ratio which C divides A, B. Using section formula,

$$\binom{-4}{2} = \frac{\binom{-4}{6} + k \binom{-4}{-6}}{1+k}$$
 (0.5)

$$\implies 2k \begin{pmatrix} 0 \\ 4 \end{pmatrix} = \begin{pmatrix} 0 \\ 4 \end{pmatrix} \tag{0.6}$$

or, 
$$k = \frac{1}{2}$$
. (0.7)

1

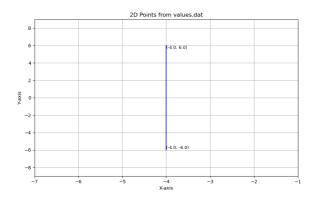


Fig. 0.1: Line connecting AB