

4.11.10

EE25BTECH11032 - Kartik Lahoti

Question:

Point **A** lies on the line segment **XY** joining **X** (6, -6) and **Y** (-4, -1) in such a way that $\frac{XA}{XY} = \frac{2}{5}$. if point **A** also lies on the line $3x + k(y + 1) = 0$, find the value of k .

Solution:

Given :

Symbol	Value	Description
X	$\begin{pmatrix} 6 \\ -6 \end{pmatrix}$	Given Point
Y	$\begin{pmatrix} -4 \\ -1 \end{pmatrix}$	Given Point
A	?	Desired Point

Using Section Formula,

$$\mathbf{A} = \frac{1}{1+p} (\mathbf{X} + p\mathbf{Y}) \quad (0.1)$$

From the question , $p = \frac{2}{3}$

Substituting the values, we get

$$\mathbf{A} = \frac{1}{1+\frac{2}{3}} \left(\begin{pmatrix} 6 \\ -6 \end{pmatrix} + \frac{2}{3} \begin{pmatrix} -4 \\ -1 \end{pmatrix} \right) = \begin{pmatrix} 2 \\ -4 \end{pmatrix} \quad (0.2)$$

Given Line Equation,

$$(3 \quad k)\mathbf{x} + k = 0 \quad (0.3)$$

Putting **A** in this equation,

$$(3 \quad k) \begin{pmatrix} 2 \\ -4 \end{pmatrix} + k = 0 \quad (0.4)$$

$$6 - 4k + k = 0 \quad (0.5)$$

$$k = 2 \quad (0.6)$$

Hence,

$$\mathbf{A} = \begin{pmatrix} 2 \\ -4 \end{pmatrix} \text{ and } k = 2 \quad (0.7)$$

