

1.9.12

EE24BTECH11001 - Aditya Tripathy

Question:

Find the length of the segment joining **A**(-6, 7) and **B**(-1, -5). Also, find the midpoint of **AB**.

Solution:

From (1.1.7.1), length of vector **X** is given by

$$\|\mathbf{X}\| = \sqrt{\mathbf{X}^T \mathbf{X}} \quad (0.1)$$

$$\mathbf{X} = \mathbf{B} - \mathbf{A} = \begin{pmatrix} -1 \\ -5 \end{pmatrix} - \begin{pmatrix} -6 \\ 7 \end{pmatrix} = \begin{pmatrix} 5 \\ -12 \end{pmatrix} \quad (0.2)$$

$$\|\mathbf{X}\| = \sqrt{\begin{pmatrix} 5 & -12 \end{pmatrix} \begin{pmatrix} 5 \\ -12 \end{pmatrix}} = \sqrt{25 + 144} = 13. \quad (0.3)$$

$$(0.4)$$

The length of the given vector = 13.

From (1.1.4.1), the point dividing **BC** in ratio $k : 1$ is given by,

$$\mathbf{D} = \frac{k\mathbf{C} + \mathbf{B}}{k + 1} \quad (0.5)$$

$$(0.6)$$

$$\mathbf{D} = \frac{\mathbf{B} + \mathbf{A}}{1 + 1} \quad (0.7)$$

$$\mathbf{D} = \begin{pmatrix} -3.5 \\ 1 \end{pmatrix} \quad (0.8)$$

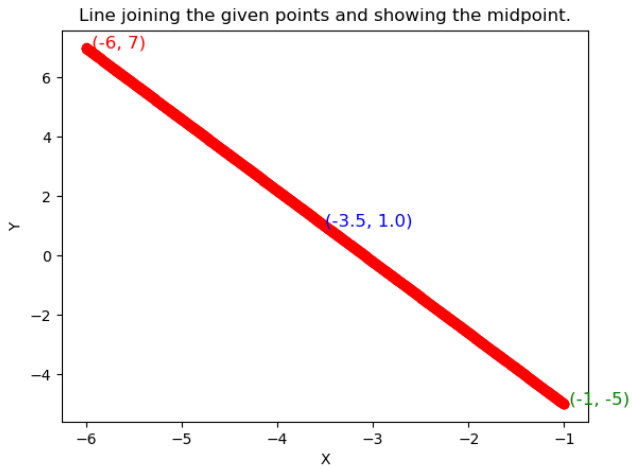


Fig. 0.1: Line joining the given points and the midpoint