1.9.12

EE24BTECH11001 - Aditya Tripathy

Question:
Find the length of the segment joining $\mathbf{A}(-6,7)$ and $\mathbf{B}(-1,-5)$. Also, find the midpoint of **AB**.

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

$$\|\mathbf{X}\| = \sqrt{\mathbf{X}^\top \mathbf{X}} \tag{0.1}$$

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

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

$$\tag{0.4}$$

The length of the given vector = 13.
From (1.1.4.1), the point dividing **BC** in ratio $k : 1$ is given by,

$$\mathbf{D} = \frac{k\mathbf{C} + \mathbf{B}}{k + 1} \tag{0.5}$$

$$\tag{0.6}$$

$$\mathbf{D} = \frac{\mathbf{B} + \mathbf{A}}{1 + 1} \tag{0.7}$$

$$\mathbf{D} = \begin{pmatrix} -3.5 \\ 1 \end{pmatrix} \tag{0.8}$$

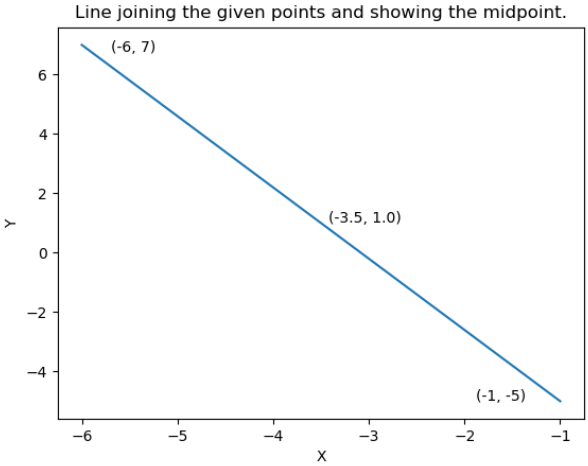

Fig. 0.1: Line joining the given points and the midpoint