

1-Vector Arithmetic

EE1030:Matrix Theory

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AI24BTECH11009

Question:1.8.13

The distance between the points **A**(0,6) and **B**(0,-2) is

Solution:

Vertex	Coordinates
A	$\begin{pmatrix} 0 \\ 6 \end{pmatrix}$
B	$\begin{pmatrix} 0 \\ -2 \end{pmatrix}$

Table 1.8.13.1 0: Vertex and its coordinates

Let the distance between **A** and **B** be **d**, then **d** is given by

$$\mathbf{d} = \|\mathbf{A} - \mathbf{B}\| \quad (0.1)$$

$$\mathbf{A} = \begin{pmatrix} 0 \\ 6 \end{pmatrix} \quad (0.2)$$

$$\mathbf{B} = \begin{pmatrix} 0 \\ -2 \end{pmatrix} \quad (0.3)$$

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} 0 \\ 6 \end{pmatrix} - \begin{pmatrix} 0 \\ -2 \end{pmatrix} \quad (0.4)$$

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} 0 - 0 \\ 6 - (-2) \end{pmatrix} \quad (0.5)$$

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} 0 \\ 8 \end{pmatrix} \quad (0.6)$$

$$(\mathbf{A} - \mathbf{B})^T = (0 \quad 8) \quad (0.7)$$

From equation ?? , distance between **A** and **B** is

$$\mathbf{d} = \|\mathbf{A} - \mathbf{B}\| \quad (0.8)$$

$$\mathbf{d} = \sqrt{(\mathbf{A} - \mathbf{B})^\top (\mathbf{A} - \mathbf{B})} \quad (0.9)$$

$$\mathbf{d} = \sqrt{\begin{pmatrix} 0 & 8 \end{pmatrix} \begin{pmatrix} 0 \\ 8 \end{pmatrix}} \quad (0.10)$$

$$\mathbf{d} = \sqrt{(0)^2 + (8)^2} \quad (0.11)$$

$$\mathbf{d} = 8 \quad (0.12)$$

Therefore the distance between **A** and **B** is 8.

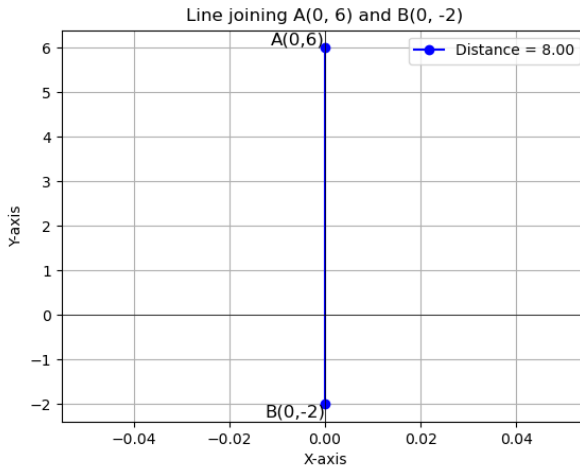


Fig. 0.1: Line joining **A** and **B**