Assignment 3

Nagaraju Naddi

Find Python Codes from below link

https://github.com/Nagarajunaddi/Assignment−3

and latex-tikz codes from

https://github.com/Nagarajunaddi/Assignment−3

1 Examples 1

1.1 Question

Find the distance between the following pair of points

$$\mathbf{A} = \begin{pmatrix} a \\ 0 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} 0 \\ b \end{pmatrix} \tag{1.1.1}$$

1.2 Solution

The distance between two vectors is given by

$$\|\mathbf{A} - \mathbf{B}\| \tag{1.2.1}$$

From (1.2.1)

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{\left(\mathbf{A} - \mathbf{B}\right)^{\mathsf{T}} \left(\mathbf{A} - \mathbf{B}\right)} \tag{1.2.2}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{\left(\begin{pmatrix} a \\ 0 \end{pmatrix} - \begin{pmatrix} 0 \\ b \end{pmatrix}\right)^{\mathsf{T}} \left(\begin{pmatrix} a \\ 0 \end{pmatrix} - \begin{pmatrix} 0 \\ b \end{pmatrix}\right)} \tag{1.2.3}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{\begin{pmatrix} a \\ -b \end{pmatrix}^{\mathsf{T}} \begin{pmatrix} a \\ -b \end{pmatrix}} \tag{1.2.4}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{\begin{pmatrix} a & -b \end{pmatrix} \begin{pmatrix} a \\ -b \end{pmatrix}} \tag{1.2.5}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{\left(a^2 + b^2\right)} \tag{1.2.6}$$

Let us assume that $\mathbf{A}$ and $\mathbf{B}$ are the vectors having real elements

$$\mathbf{A} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$$

$$\mathbf{B} = \begin{pmatrix} 0 \\ 3 \end{pmatrix}$$

$$\|\mathbf{A} - \mathbf{B}\| = 3.6055 \tag{1.2.7}$$

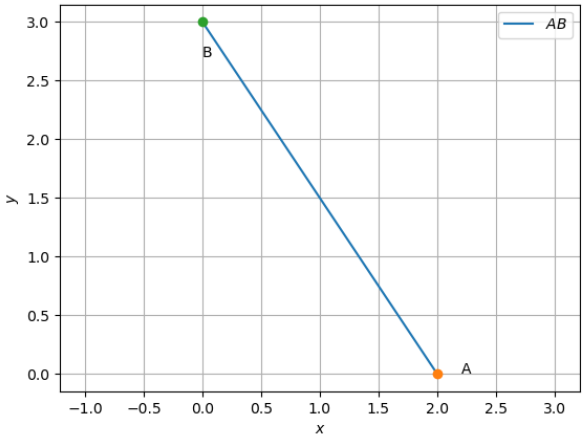

Fig. 0: Line between A and B