friendly

1.9.8

EE25BTECH11019 – Darji Vivek M.

Question

The distance between the points $(0, 0)$ and $(a - b,\ a + b)$ is _____

$(10, 2021)$

Variables Used

Symbol	Meaning
A	Point $(0, 0)$
B	Point $(a - b,\ a + b)$
a, b	Parameters
d	Distance between points

Distance Formula

$$\mathbf{A} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \quad \mathbf{B} = \begin{pmatrix} a-b \\ a+b \end{pmatrix} \tag{1}$$

$$d = \mathbf{A} - \mathbf{B} \tag{2}$$

Substitution

$$d = \begin{pmatrix} 0 \\ 0 \end{pmatrix} - \begin{pmatrix} a-b \\ a+b \end{pmatrix} \tag{3}$$

$$= \begin{pmatrix} -(a-b) \\ -(a+b) \end{pmatrix} \tag{4}$$

$$= \sqrt{(a-b)^2 + (a+b)^2} \tag{5}$$

Simplification

$$d = \sqrt{a^2 - 2ab + b^2 + a^2 + 2ab + b^2} \tag{6}$$

$$= \sqrt{2a^2 + 2b^2} \tag{7}$$

$$= \sqrt{2}\sqrt{a^2 + b^2} \tag{8}$$

Final Answer

$$\boxed{d = \sqrt{2}\sqrt{a^2 + b^2}}$$

C Function: Compute Distance Between Points

Compile C Code as Shared Library

Python: Load C Library

Python: Call C Function

Python: Define Points for Plot

Python: Plot Line and Points

Python: Decorations and Save Figure

plot

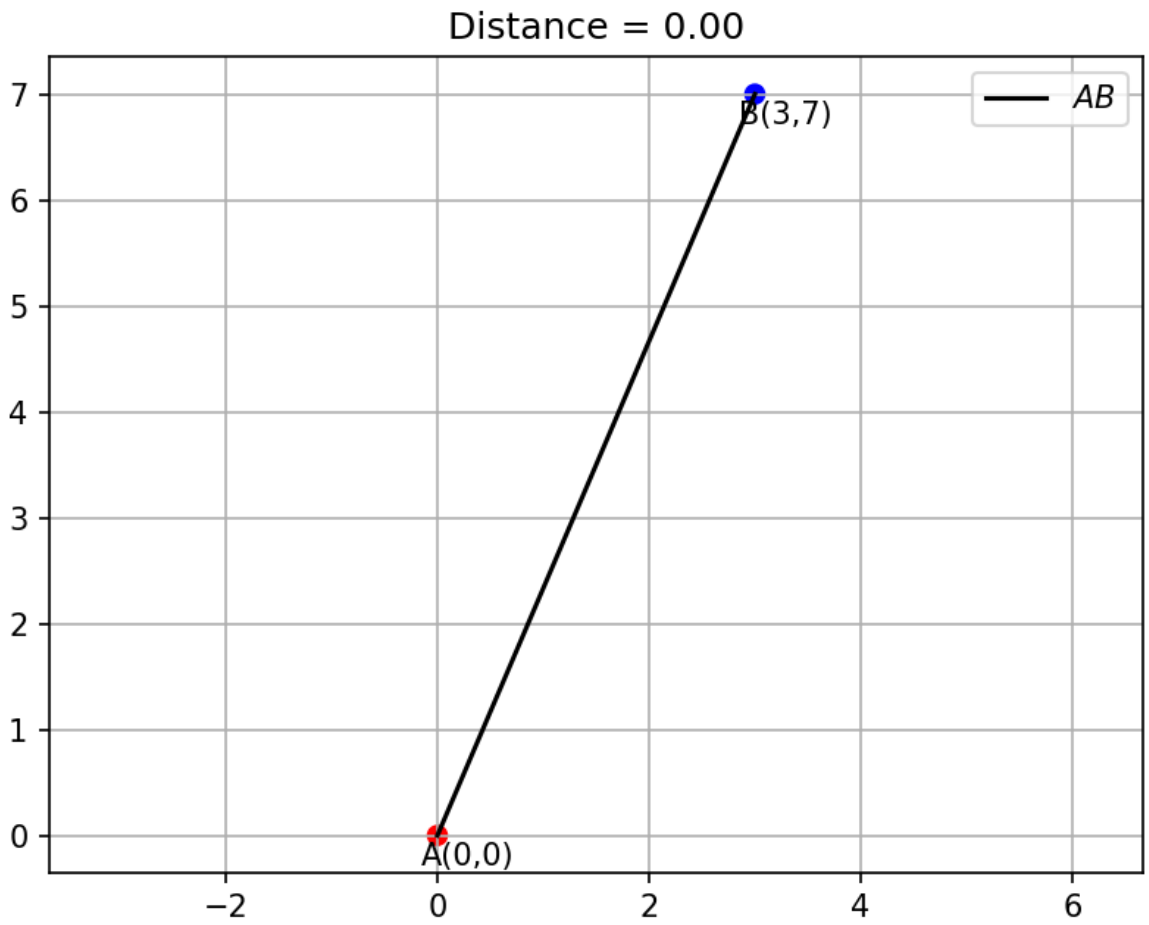

Figure: plot