

# ASSIGNMENT-3

Find the python code from below link

<https://raw.githubusercontent.com/TGURUBALAJI/INTERNSHIP-IITH/main/Assignment%20-3/code.py>

Find the Latex code from below link

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## 1 QUESTION NO-3

$(-3, -2)$  and  $(-6, 7)$ , the axes being inclined at  $60^\circ$ .

Solution :  $A = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$ ,  $B = \begin{pmatrix} -6 \\ 7 \end{pmatrix}$

axes being incline at  $60^\circ$  formula for linear transformation from angular coordinates  $\mathbf{X} = \mathbf{P}\mathbf{X}_n$

where  $\mathbf{X}$  = coordinates in linear coordinates

(1.0.1)

$\mathbf{X}_n$  = Angular coordinates

(1.0.2)

$$\mathbf{P} = \begin{pmatrix} 1 & \cos(\theta) \\ 0 & \sin(\theta) \end{pmatrix} \quad (1.0.3)$$

$$\mathbf{A} = \begin{pmatrix} 1 & \cos(60^\circ) \\ 0 & \sin(60^\circ) \end{pmatrix} \begin{pmatrix} -3 \\ -2 \end{pmatrix} \quad (1.0.4)$$

$$\mathbf{A} = \begin{pmatrix} -3 - 2 \cos(60^\circ) \\ -2 \sin(60^\circ) \end{pmatrix} \quad (1.0.5)$$

$$\mathbf{B} = \begin{pmatrix} 1 & \cos(60^\circ) \\ 0 & \sin(60^\circ) \end{pmatrix} \begin{pmatrix} -6 \\ 7 \end{pmatrix} \quad (1.0.6)$$

$$\mathbf{B} = \begin{pmatrix} -6 + 7 \cos(60^\circ) \\ 7 \sin(60^\circ) \end{pmatrix} \quad (1.0.7)$$

distance between two points is given by

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} -3 - 2 \cos(60^\circ) \\ -2 \sin(60^\circ) \end{pmatrix} - \begin{pmatrix} -6 + 7 \cos(60^\circ) \\ 7 \sin(60^\circ) \end{pmatrix}$$

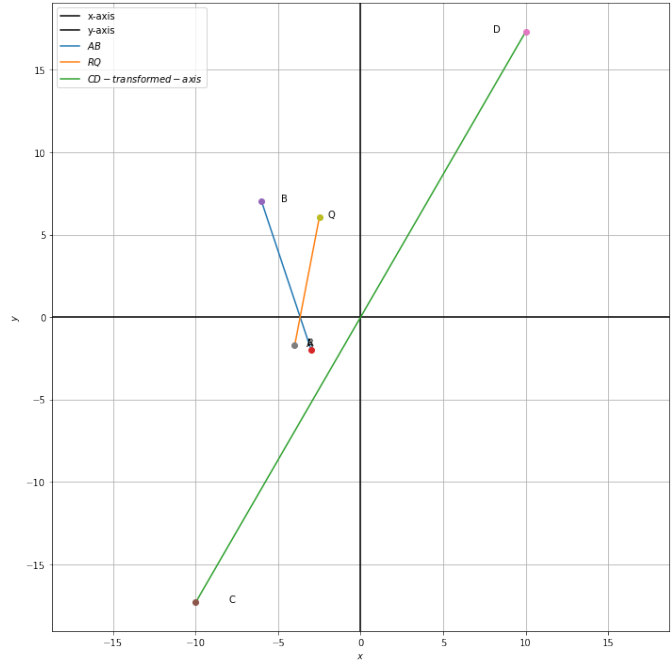


Fig. 0: transformed lines

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} 3 - 9 \cos(60^\circ) \\ -9 \sin(60^\circ) \end{pmatrix}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{\begin{pmatrix} 3 - 9 \cos 60^\circ & -9 \sin 60^\circ \end{pmatrix} \begin{pmatrix} 3 - 9 \cos(60^\circ) \\ -9 \sin(60^\circ) \end{pmatrix}}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{(3 - 9 \cos 60^\circ)^2 + (-9 \sin 60^\circ)^2}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{9 + 81 \cos^2 60^\circ - 54 \cos 60^\circ + 81 \sin^2 60^\circ}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{9 + 81 - 54 \cos 60^\circ}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{90 - 27}$$

$$\|\mathbf{A} - \mathbf{B}\| = \sqrt{63}$$

$$\|\mathbf{A} - \mathbf{B}\| = 7.9372$$

Distance between two points is 7.9372 .