

AL: Akram
03-134221-007

10/10

Question no: 01

Using the transformation matrix translate points $(2, -6)$ $T(3, 7)$

Solution:-

points $(2, -6)$ $T(3, 7)$

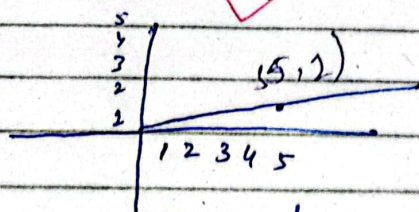
$$T = \begin{bmatrix} 1 & 0 & 3 \\ 0 & 1 & 7 \\ 0 & 0 & 1 \end{bmatrix} \quad P = \begin{bmatrix} 2 \\ -6 \\ 1 \end{bmatrix}$$

$$P' = T \cdot P = \begin{bmatrix} 1 & 0 & 3 \\ 0 & 1 & 7 \\ 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 2 \\ -6 \\ 1 \end{bmatrix}$$

$$P' = \begin{bmatrix} 5 \\ 1 \\ 1 \end{bmatrix}$$

The translated point $P(5, 1)$

Question no: 05

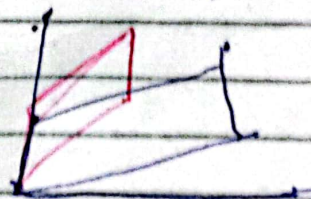
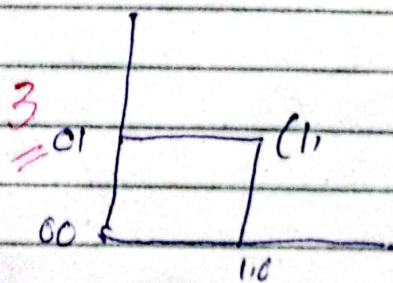


Shear units square by 2 units parallel to y-axis

$$\begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$



Question no. 02

The triangle has vertices $a(2, 3)$, $b(4, 3)$, $c(3, 6)$. Find the image of R when it is rotated anticlockwise by 90° degrees about the point $(3, 4)$.

Solutions

$a(2, 3)$, $b(4, 3)$, $c(3, 6)$ for $\theta = 90^\circ$ degrees.

This is clockwise direction

$$S(A) = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix} \begin{bmatrix} 2 \\ 3 \end{bmatrix} \quad \theta = 90^\circ$$

$$S(A) = \begin{bmatrix} \cos 90^\circ & -\sin 90^\circ \\ \sin 90^\circ & \cos 90^\circ \end{bmatrix} \begin{bmatrix} 2 \\ 3 \end{bmatrix} \quad S(A) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \end{bmatrix} = \begin{bmatrix} -3 \\ 2 \end{bmatrix}$$

$$S(B) = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix} \begin{bmatrix} 4 \\ 3 \end{bmatrix} \quad \theta = 90^\circ$$

$$S(B) = \begin{bmatrix} \cos 90^\circ & -\sin 90^\circ \\ \sin 90^\circ & \cos 90^\circ \end{bmatrix} \begin{bmatrix} 4 \\ 3 \end{bmatrix} \quad S(B) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 4 \\ 3 \end{bmatrix} = \begin{bmatrix} -3 \\ 4 \end{bmatrix}$$

$$S(C) = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix} \begin{bmatrix} 3 \\ 6 \end{bmatrix} \quad \theta = 90^\circ$$

$$S(C) = \begin{bmatrix} \cos 90^\circ & -\sin 90^\circ \\ \sin 90^\circ & \cos 90^\circ \end{bmatrix} \begin{bmatrix} 3 \\ 6 \end{bmatrix} \quad S(C) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 3 \\ 6 \end{bmatrix} = \begin{bmatrix} -6 \\ 3 \end{bmatrix}$$

