

Section -4

Ans-3

$$[A \ B \ C] = \begin{bmatrix} 0 & 1 & 5 \\ 0 & 1 & 2 \\ 1 & 1 & 1 \end{bmatrix}$$

rotation about $(-1, -1)$

$$\begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos 45^\circ & -\sin 45^\circ & 0 \\ \sin 45^\circ & \cos 45^\circ & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1/\sqrt{2} & -1/\sqrt{2} & 0 \\ 1/\sqrt{2} & 1/\sqrt{2} & 2/\sqrt{2} \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1/\sqrt{2} & -1/\sqrt{2} & -1 \\ 1/\sqrt{2} & -1/\sqrt{2} & 2/\sqrt{2}-1 \\ 0 & 0 & 1 \end{bmatrix}$$

Matrix after Rotation

$$\begin{bmatrix} 1/\sqrt{2} & -1/\sqrt{2} & -1 \\ 1/\sqrt{2} & 2/\sqrt{2} & 2/\sqrt{2}-1 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & 1 & 5 \\ 0 & 1 & 2 \\ 1 & 1 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} -1 & 1 & 3/\sqrt{2}-1 \\ 2/\sqrt{2}-1 & 4/\sqrt{2}-1 & 9/\sqrt{2}-1 \\ 1 & 1 & 1 \end{bmatrix}$$

$$A' = (-1, \sqrt{2}-1)$$

$$B' = (-1, 2\sqrt{2}-1)$$

$$C' = (3\sqrt{2}/2 - 1, \frac{9}{2}\sqrt{2}-1)$$