VR Assignment 2

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1 Answer

Roll counterclockwise by $\pi/4$. Translate by -1 in the X-axis and translate by 2 in the Y-Axis

2 Answer

$$T_2 = \begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & cos(45) & -sin(45) & 0 \\ 0 & sin(45) & cos(45) & 2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

3 Answer

$$T_1 = \begin{bmatrix} \frac{1}{\sqrt{2}} & -\frac{1}{\sqrt{2}} & 0 & -1 \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$T_1^{-1} = \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 \\ -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & -2 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$T_2^{-1} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & cos(45) & sin(45) & 0 \\ 0 & -sin(45) & cos(45) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & 0 & 0 & -3 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$(T_1^{-1}T_2^{-1}) = \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 \\ -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & -2 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & cos(45) & sin(45) & 0 \\ 0 & -sin(45) & cos(45) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & 0 & 0 & -3 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

4 Answer

$$q_1 = \begin{pmatrix} 0 & 0 & 0 & \pi/4 \end{pmatrix}$$

$$q_2 = \begin{pmatrix} 0 & \pi/4 & 0 & 0 \end{pmatrix}$$

$$q_1 \cdot q_2 = \begin{pmatrix} (0 \times 0) & (0 \times \pi/4) & (0 \times 0) & (\pi/4 \times 0) \end{pmatrix}$$

$$q_1 \cdot q_2 = \begin{pmatrix} 0 & 0 & 0 & 0 \end{pmatrix}$$