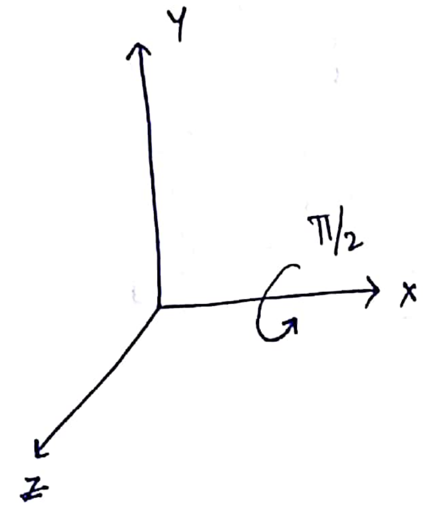
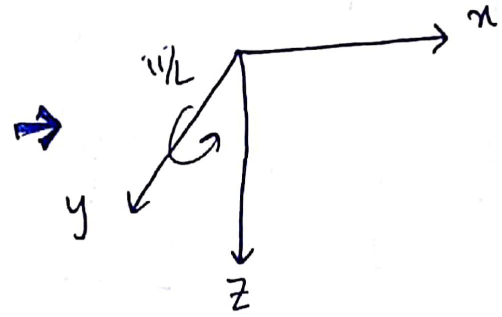
(Q1) Initial frame:-





$$R_x = \begin{bmatrix} 1 & 0 & 0 \\ 0 & c\left(\frac{\pi}{2}\right) & -s\left(\frac{\pi}{2}\right) \\ 0 & s\left(\frac{\pi}{2}\right) & c\left(\frac{\pi}{2}\right) \end{bmatrix}$$

$$R_x = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{bmatrix}$$

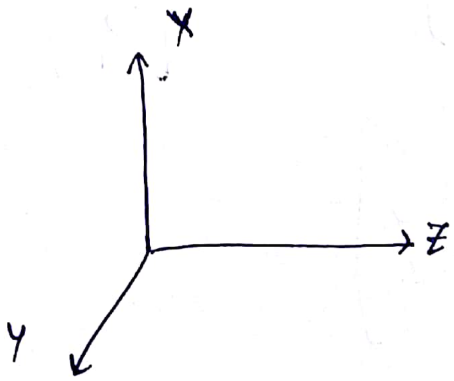
$$R_y = \begin{bmatrix} c\left(\frac{\pi}{2}\right) & 0 & s\left(\frac{\pi}{2}\right) \\ 0 & 1 & 0 \\ -s\left(\frac{\pi}{2}\right) & 0 & c\left(\frac{\pi}{2}\right) \end{bmatrix}$$

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

$${}^{A}R_B = R_x \cdot R_y$$

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

final frame



(Q2) $${}^{1}R_0 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad {}^{1}d_0 = \begin{bmatrix} 0 \\ -1 \\ -1 \\ 1 \end{bmatrix} \quad {}^{1}T_0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^{2}R_0 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad {}^{2}d_0 = \begin{bmatrix} 0.5 \\ -1.5 \\ -1 \\ 1 \end{bmatrix} \quad {}^{2}T_0 = \begin{bmatrix} 1 & 0 & 0 & 0.5 \\ 0 & 1 & 0 & -1.5 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^{3}R_0 = R_{\cancel{z}_3}\left(\frac{\pi}{2}\right) \cdot R_{x_3}(\pi)$$

$$= \begin{bmatrix} c(\frac{\pi}{2}) & -s(\frac{\pi}{2}) & 0 \\ s(\frac{\pi}{2}) & c(\frac{\pi}{2}) & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & c(\pi) & -s(\pi) \\ 0 & s(\pi) & c(\pi) \end{bmatrix}$$

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

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

$${}^{0}\cancel{d}_3 \quad {}^{3}d_0 = \begin{bmatrix} -1.5 \\ 0.5 \\ 3 \\ 1 \end{bmatrix} \quad {}^{3}T_0 = \begin{bmatrix} 0 & 1 & 0 & -1.5 \\ 1 & 0 & 0 & 0.5 \\ 0 & 0 & -1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^{2}R_3 = {}^{3}R_0 = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{bmatrix} \quad {}^{2}d_3 = \begin{bmatrix} 0 \\ 0 \\ 2 \\ 1 \end{bmatrix}$$

$${}^{2}T_3 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$