

Hints

Forward Transformation

Task 1.

	q_i	Θ	d	a	α
a)	1	$q_1 + \frac{\pi}{2}$	h_1	0	$+\frac{\pi}{2}$
	2	q_2	l	0	$-\frac{\pi}{2}$
	3	$-\frac{\pi}{2}$	$q_3 + h_2 + h_3$	0	0

$$b) {}^0T_1 = \begin{bmatrix} -S_{q_1} & 0 & C_{q_1} & 0 \\ C_{q_1} & 0 & S_{q_1} & 0 \\ 0 & 1 & 0 & h_1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^1T_2 = \begin{bmatrix} C_{q_2} & 0 & -S_{q_2} & 0 \\ S_{q_2} & 0 & C_{q_2} & 0 \\ 0 & -1 & 0 & l \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^2T_3 = \begin{bmatrix} 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & h_2 + h_3 + q_3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$${}^0T_3 = \begin{bmatrix} C_{q_1} & -S_{q_1}C_{q_2} & S_{q_1}S_{q_2} & lC_{q_1} + (h_2 + h_3 + q_3)S_{q_1}S_{q_2} \\ S_{q_1} & C_{q_1}C_{q_2} & -C_{q_1}S_{q_2} & lS_{q_1} - (h_2 + h_3 + q_3)C_{q_1}S_{q_2} \\ 0 & S_{q_2} & C_{q_2} & h_1 + (h_2 + h_3 + q_3)C_{q_2} \\ 0 & 0 & 0 & 1 \end{bmatrix}$$