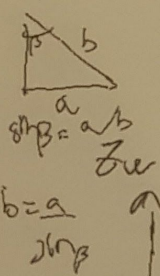


Due to redundancy



$$\begin{aligned}
 L_2 + L_3 + L_4 \sin(\theta_2) &= L_{d3} \\
 L_5 + L_6 &= L_{d2} \quad K_1 \\
 L_4 \cos(\theta_2) &= L_{a3} \quad K_3 \\
 90^\circ + \theta_1 &= \theta_{23} \quad K_4 \\
 L_{10} + L_{11} &= L_{g4} \quad K_5 \\
 L_{10} \tan(\theta_1) &= L_{cm3} \quad K_6 \\
 LK + \frac{L}{2} &= L_{cm4} \quad K_7
 \end{aligned}$$

$$K_8 = L_{10} + L_{11} + \frac{L_{12} + L_{13}}{\cos \theta_1} \quad K_9 = \frac{L_{12} + L_{13}}{\sin \theta_1}$$

	θ	d	a	α
1	q_1	L_4	0	-90
2	90	$q_2 + K_1$	0	-90
3	0	$q_3 + K_2$	$-K_3$	$-K_4$
4	q_4	K_5	0	θ_1

	θ	d	a	α
cm1	$90 + q_1$	L_{11}	$L_5/2$	0
cm2	0	$q_2 + K_1$	$L_7/2$	0
cm3	$-K_8$	$q_3 + K_2$	$-K_9$	0
cm4	$90 + q_4$	K_{10}	$-K_{11}$	0

$$\theta_{cm3} = \tan^{-1} \left(\frac{L_{10}}{\cos \theta_1} \right) = K_8 \quad d_{cm3} = \frac{L_{10}}{\cos \theta_1} = (\sin(K_8)) \cdot K_9$$