$$H^0_1 = \begin{bmatrix} \cos\theta_1 & -\sin\theta_1 & 0 \\ \sin\theta_1 & \cos\theta_1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$H^1_2 = \begin{bmatrix} 1 & 0 & l_1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$H^2_3 = \begin{bmatrix} \cos\theta_2 & -\sin\theta_2 & 0 \\ \sin\theta_2 & \cos\theta_2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$H^3_4 = \begin{bmatrix} 1 & 0 & l_2 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$H^0_4 = H^0_1 \cdot H^1_2 \cdot H^2_3 \cdot H^3_4$$

$$H^0_2 = \begin{bmatrix} \cos\theta_1 & -\sin\theta_1 & 0 \\ \sin\theta_1 & \cos\theta_1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & l_1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} \cos\theta_1 & -\sin\theta_1 & l_1\cos\theta \\ \sin\theta_1 & \cos\theta_1 & l_1\sin\theta \\ 0 & 0 & 1 \end{bmatrix}$$

$$H^0_3 = \begin{bmatrix} \cos\theta_1 & -\sin\theta_1 & l_1\cos\theta \\ \sin\theta_1 & \cos\theta_1 & l_1\sin\theta \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos\theta_2 & -\sin\theta_2 & 0 \\ \sin\theta_2 & \cos\theta_2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\cancel{= \left[\cos\theta_1 \cdot \cos\theta_2 + (-\sin\theta_1 \cdot \sin\theta_2) \right.}$$

$$
= \begin{bmatrix} \cos\theta_1 \cdot \cos\theta_2 + (-\sin\theta_1 \cdot \sin\theta_2) & -\sin\theta_2 \cos\theta_1 + (-\sin\theta_1 \cos\theta_2) & l_1 \cos\theta_1 \\ \sin\theta_1 \cdot \cos\theta_2 + \cos\theta \cdot \sin\theta_2 & -\sin\theta_1 \sin\theta_2 + \cos\theta_1 \cos\theta_2 & l_1 \sin\theta_1 \\ 0 & 0 & 1 \end{bmatrix}
$$

dari identitas

$$\sin(\theta_1+\theta_2) = \sin\theta_1 \cos\theta_2 + \sin\theta_2 \cos\theta_1$$

$$\cos(\theta_1+\theta_2) = \cos\theta_1 \cos\theta_2 - \sin\theta_1 \sin\theta_2$$

$$
= \begin{bmatrix} \cos(\theta_1+\theta_2) & -\sin(\theta_1+\theta_2) & l_1 \cos\theta_1 \\ \sin(\theta_1+\theta_2) & \cos(\theta_1+\theta_2) & l_1 \sin\theta_1 \\ 0 & 0 & 1 \end{bmatrix}
$$

$$
H^0_4 = \begin{bmatrix} \cos(\theta_1+\theta_2) & -\sin(\theta_1+\theta_2) & l_2 \cos(\theta_1+\theta_2) + l_1 \cos\theta_1 \\ \sin(\theta_1+\theta_2) & \cos(\theta_1+\theta_2) & l_2 \sin(\theta_1+\theta_2) + l_1 \sin\theta_1 \\ 0 & & 1 \end{bmatrix}
$$

Sehingga

$$
H^0_4 \begin{bmatrix} \cos(\theta_1+\theta_2) & -\sin(\theta_1+\theta_2) & l_1 \cos\theta_1 + l_2 \cos(\theta_1+\theta_2) \\ \sin(\theta_1+\theta_2) & \cos(\theta_1+\theta_2 & l_1 \sin\theta_1 + l_2 \sin(\theta_1+\theta_2) \\ 0 & 0 & 1 \end{bmatrix}
$$