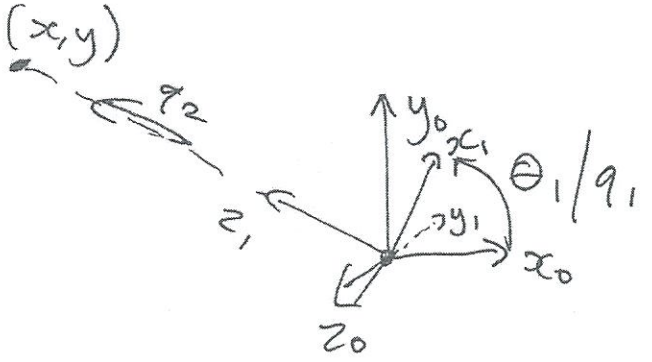
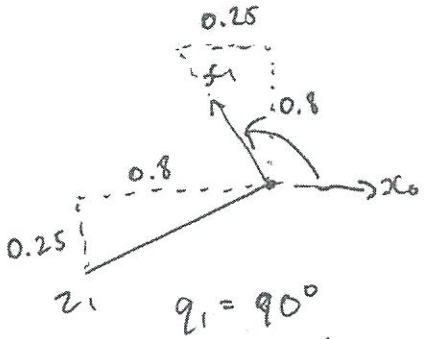
1. 1.





$q_1 = 90°$

$+\text{atan}^2(0.8, 0.2$
$= 107.4°$ //

$V = J_V \dot{q}$

$\dot{q} = J_V^{-1} V$

$J_V = ?$

$x = -q_2 \sin q_1 \qquad y = q_2 \cos q_1$

$$J_V = \begin{bmatrix} \frac{\partial x}{\partial q_1} & \frac{\partial x}{\partial q_2} \\ \frac{\partial y}{\partial q_1} & \frac{\partial y}{\partial q_2} \end{bmatrix} = \begin{bmatrix} -q_2 \cos q_1 & -\sin q_1 \\ -q_2 \sin q_1 & \cos q_1 \end{bmatrix}$$

$\dot{q} = J_V^{-1} V$ $\qquad J_V^{-1} = -\frac{1}{q_2} \begin{bmatrix} \cos q_1 & +\sin q_1 \\ q_2 \sin q_1 & -q_2 \cos q_1 \end{bmatrix}$

$q_1 = 107.4° \quad q_2 = 0.8382\,m$

$$= -\begin{bmatrix} -0.3568 & +1.1384 \\ 0.9542 & +0.2990 \end{bmatrix}$$

$$V = \begin{bmatrix} 0 \\ 0.5 \end{bmatrix}$$

$$\dot{q} = \begin{bmatrix} -0.5692 \\ -0.1495 \end{bmatrix} \begin{matrix} \leftarrow \text{rad/s} \\ \leftarrow \text{m/s.} \end{matrix}$$

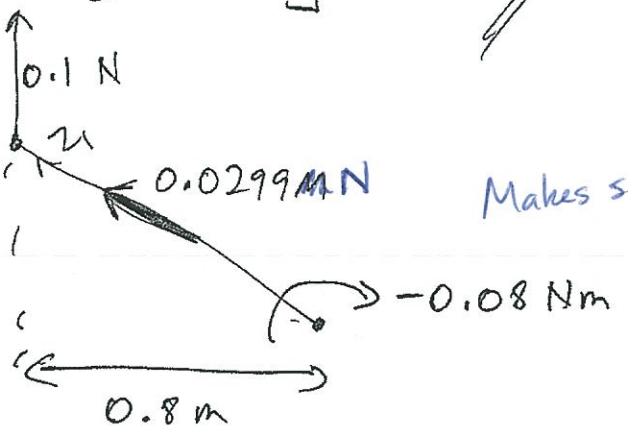
2. $\tau = J^T F = \begin{bmatrix} 0.2507 & -0.9542 \\ -0.7998 & +0.2990 \end{bmatrix}^T \times \begin{bmatrix} 0 \\ 0.1 \end{bmatrix}$

$J = f(q)$

Jacobian for $q_1 = 72.6°$

has q changed ($q = (q_1, q_2)$)

$= \begin{bmatrix} -0.08 \\ 0.0299 \end{bmatrix}$ — -0.08 N.m, 0.0299 N



Makes sense.