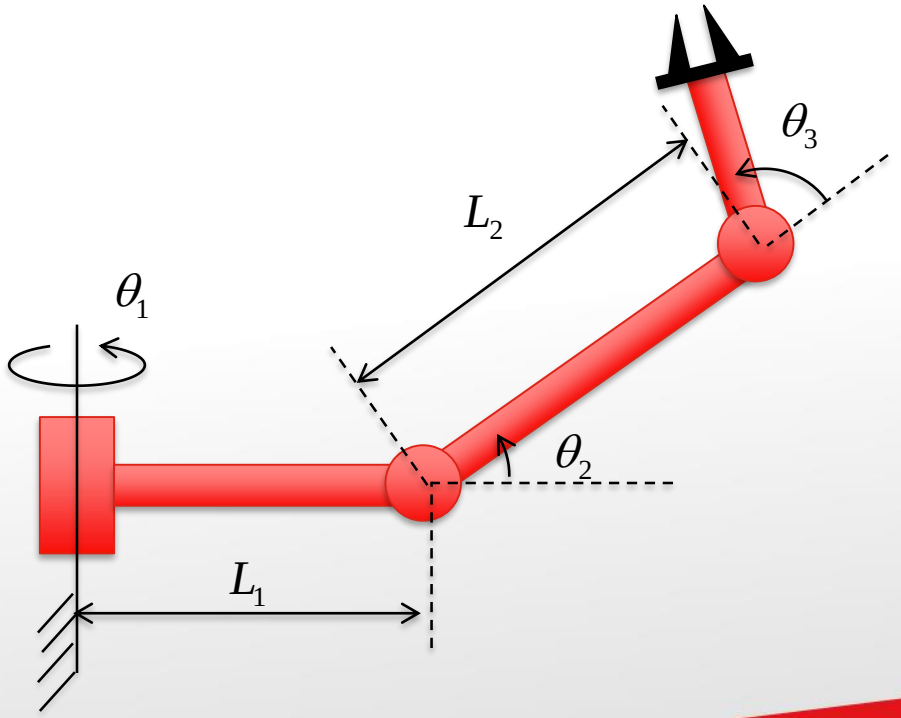
Tutorials for Week 5 –Jacobians: Velocities and Static Forces

RMIT UNIVERSITY

Tutorial Assignments

- **Question 1:**
  - Find the Jacobian of the manipulator shown on the right. (You should already have some information about this robot in earlier tutorials).
  - Write it in terms of frame {3} at the wrist of robot.
    - Velocity propagation method.
    - Differentiation of kinematic equations.
  - Write also in terms of frame {4} at the tip of hand, having same orientation as {3}.



Tutorial Assignments

- **Question 2:**
  - A 2-ink manipulator has the following Jacobian:

$$^{0}J(\theta)=\begin{bmatrix} -l_1 s_1 - l_2 s_{12} & -l_2 s_{12} \\ l_1 c_1 + l_2 c_{12} & l_2 c_{12} \end{bmatrix}$$

  - If we ignore gravity, what are the joint torques required so that the manipulator can apply a static force of $^{0}F = 10\hat{X}_0$?

Tutorial Assignments

- **Question 3:**
  - Find the Jacobian of the manipulator shown on the right. (You should already have some information about this robot in earlier tutorials).
  - Write it in terms of frame {3} at the wrist of robot.
    - Explicit form for Jacobian.
  - Write also in terms of frame {4} at the tip of hand, having same orientation as {3}.