CS4610/CS5335: Homework 2

Out: 2/6/15, Due: 2/13/15

Please turn in this homework to Rob Platt in class on the due date.

Problem 1: Consider the two axis angle rotations, $k_1 = (\frac{\pi}{3}, 0, 0)^T$ and $k_2 = (0, \frac{\pi}{3}, 0)^T$. What is the axis angle rotation describing the k_2 rotation in the reference frame of k_1? Solve this part of the problem twice: once using rotation matrices to find the difference rotation and once using quaternions. What axis angle orientation (with respect to the base frame) is halfway between k_1 and k_2?

Problem 2: Calculate the velocity Jacobians (not orientation) for the robots shown in Figures 1 and 2. Express both Jacobians in the base (stationary) frame.

Problem 3: Express the velocity Jacobian for the manipulator in Figure 1 in the end effector frame.

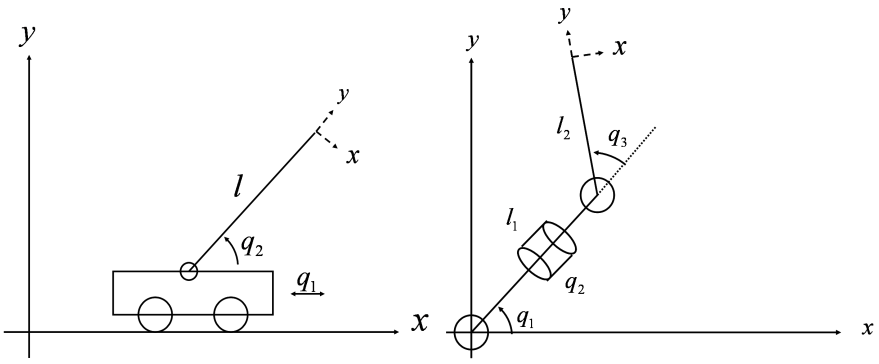

Figure 1: Used in Problems 2 and 3