**ME 115(b): Homework #1**

(Due Thursday Jan. 11, 2001)

**Problem #1:** (Related to Problem #3, Chapter 3 of MLS)

Solve the inverse kinematic problem, using any technique that you like, for manipulator (iv) in Figure 3.23.

**Problem #2:** (Related to Problem #3, Chapter 3 of MLS)

**Part (a):** For Manipulator (iii) in Figure 3.23 (i.e., the "elbow manipulator"), let the link lengths be $a_2 = 1$ and $a_3 = 1$. Let the desired position of the tool frame origin be $(x, y, z) = (1.0, 1.0, 1.0)$. Solve the inverse kinematics problem for this given location.

**Part (b):** For Manipulator (iv), solve the inverse kinematic problem for the same data as Part (a).

**Problem #3:** (Related to Problem #3($c$), Chapter 3 of MLS)

**Part (a):** Find the spatial Jacobian matrix for manipulator (iv) of Figure 3.23.

**Part (b):** Find the singularities of the manipulator in part (a) of this problem.