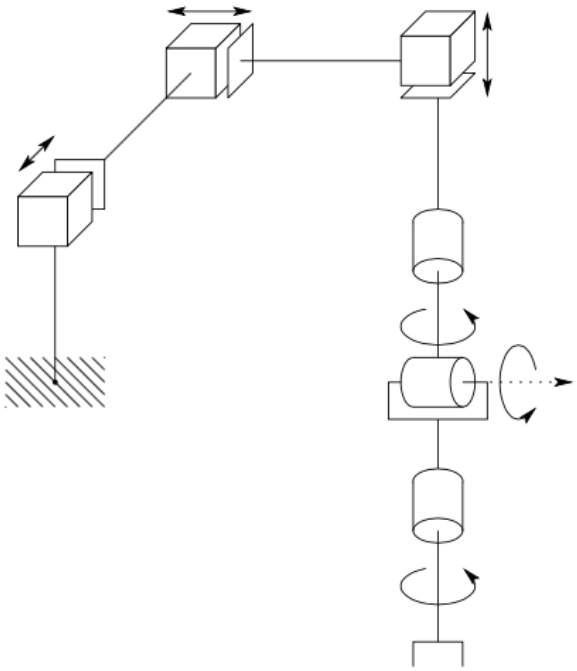
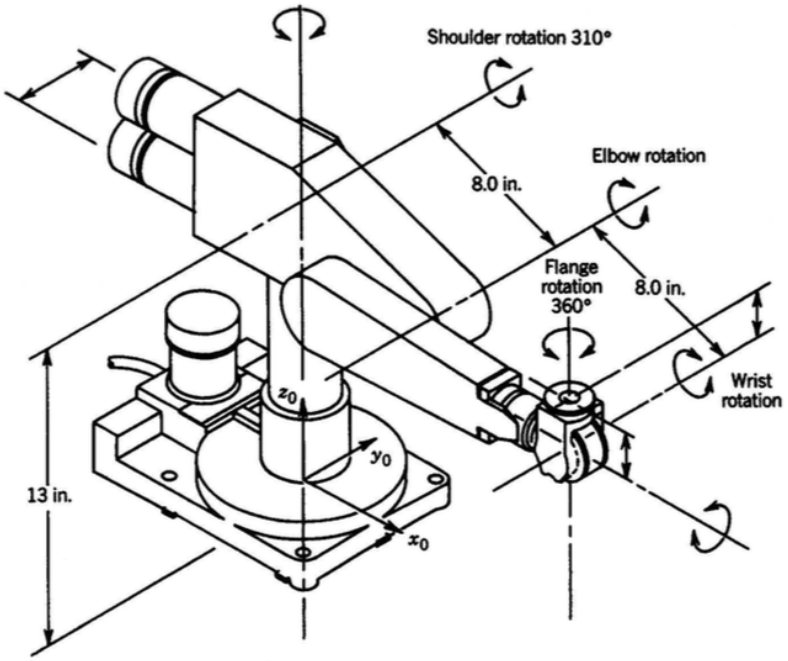
Homework 5 (Problem numbers from textbook)

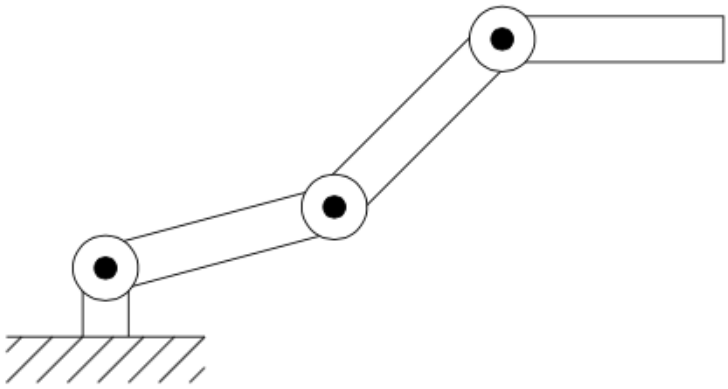
3.9 Write the forward kinematics equations (attach the DH frames, write the DH table, then write the homogeneous transformation matrices and multiply them together to find the end effector coordinate frame in terms of the base frame) using the DH convention for the manipulator shown below (three-link Cartesian manipulator + a spherical wrist).



3.10 Write the forward kinematics equations using the DH convention for the PUMA 260 manipulator shown below.



3.11 Find the inverse position kinematics for the manipulator (three-link planar arm with three revolute joints) shown below, i.e., given a desired position of the end-effector, find the joint variables. Given a desired position of the effector, how many solutions are there to the inverse kinematics of the three-link planar arm? If the desired orientation of the end-effector is also specified, how many solutions are there?



3.12 Repeat Problem 3.11 for the manipulator (three-link planar arm with two revolute joints and one prismatic joint) shown below.