

# ROBOTICS ME 521

## Homework Problems-I

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1. For the 3 degrees of freedom manipulator shown in figure 1 (left one), attach the frames to all the links and find out the transformation matrix between base and tool frame.

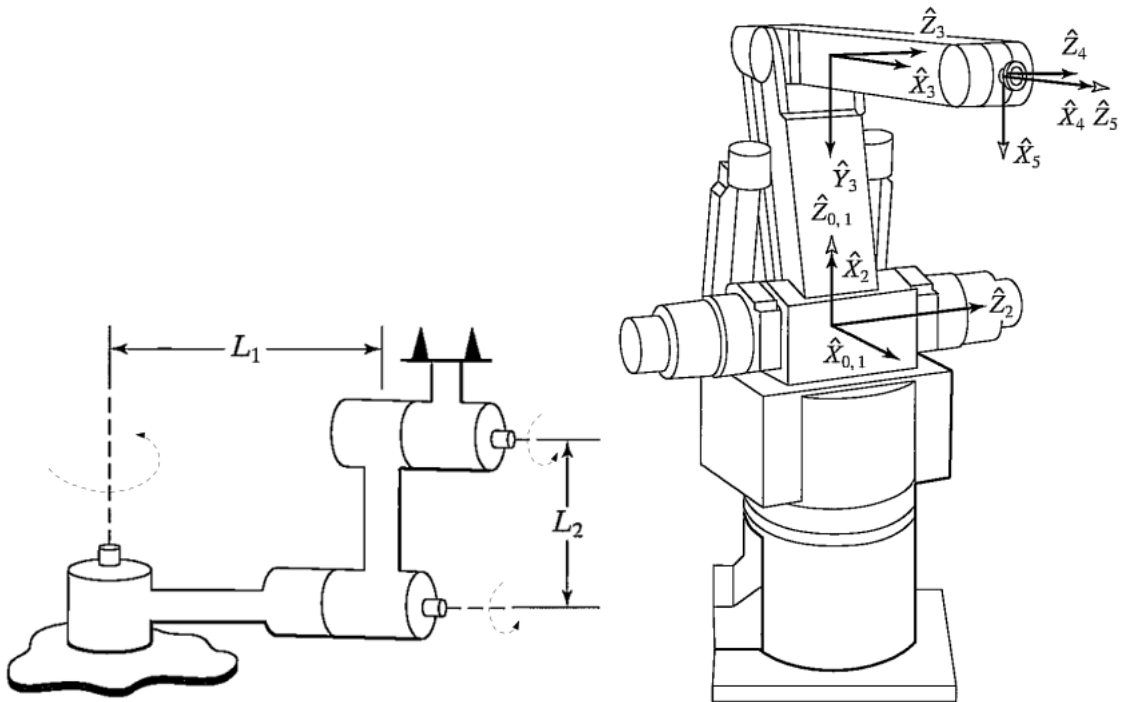


Figure 1:

2. For the manipulator shown in figure 1 (right one),

- identify the frames whose origins are coinciding, and
- find out the transformation matrix between base frame and tool frame.

and gives an output in the form of overall rotation matrix. (The program should be such that one should be able to choose the frame, the order of rotation and angle of rotation.)

3. For the PUMA robot, shown in figure 2, find out the transformation matrix between base frame and tool frame. The last link is shown separately to make the frames positions clear. The origins of frames 4, 5 and 6 are coinciding.

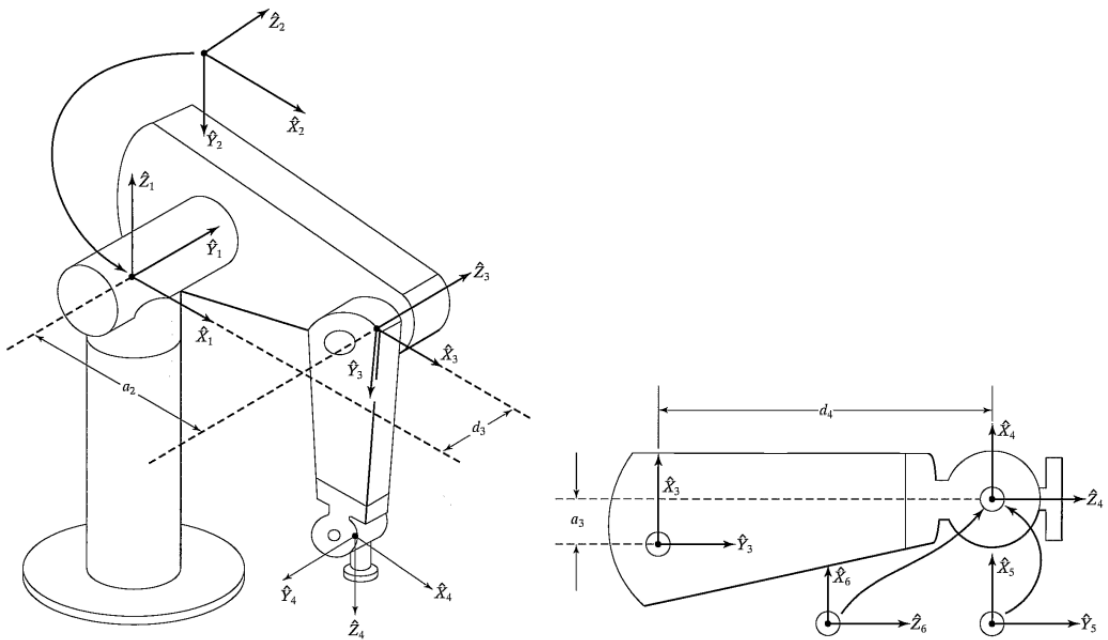


Figure 2: