

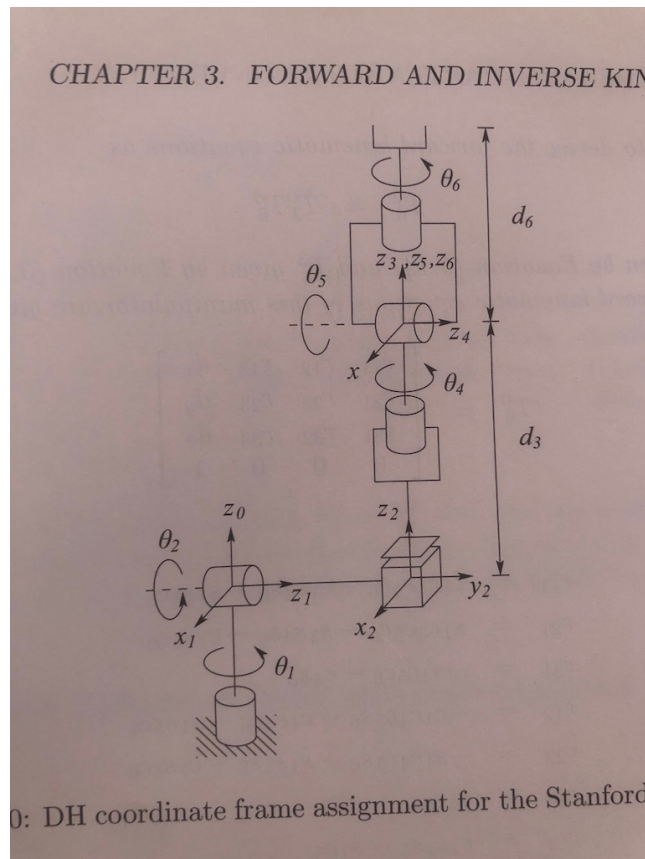
RBE 500 - Homework 3

Part 1:

Solve questions

- 4.2 (0.5 pts)
- 4.3 (1pts)
- 4.5 (1 pts)

- (2.5 pts): Drive the Jacobian for the Stanford manipulation depicted in Figure 3.10 of your book (photo below)



You can keep the terms such as is (e.g. z_1^0 , z_2^0 , o_3^1 , etc.), but explain how you could calculate them (e.g. "I could calculate z_1^0 using the homogenous transformation matrix $[X]$ as follow..." and explain).

Part 2: (5 pts)

Consider the robot in Problem 3.5 in HW 2. Write a node that solves the forward kinematics of the manipulator as follows:

- Write a ROS node that has a subscriber that listens to a topic for q1, q2 and q3. Once a message is received via that topic, the node should calculate the end effector pose for the given q1, q2 and q3, and print it to the command window
- Test your node by publishing q1, q2, q3 values to the topic using the “ros2 topic pub..” command.
- **Submission instructions:**
 - o Please submit only the folder of your package. Your package folder will include the following if you are using C++

```
my_package/
  CMakeLists.txt
  include/my_package/
  package.xml
  src/
```

and the following if you are using python

```
my_package/
  package.xml
  resource/my_package
  setup.cfg
  setup.py
  my_package/
```

Do not submit your whole workspace, which would include the packages that you have previously created.

- o Be sure to test your package with three different q1, q2 and q3 values. Take a screenshot of the terminal showing the response of the “ros2 topic pub..” commands.
- o Please be sure that your code is well commented, i.e. for each portion of the code, add explanations for what your code does. You can do this by adding comments inside the code file. Please include a screenshot of the commented code to your report. **Submitting non-commented code gets penalized.**