

MeEn 537 Homework #2

1. Work the following problems from chapter 2 in your textbook:
 - (a) 6
 - (b) 12
 - (c) 13
 - (d) 19
2. Work the following problems from the Spong Robotics Textbook which I will hand out in class:
 - (a) 2-37
 - (b) 2-38
 - (c) 3-4 (make sure to include a sketch and assigned coordinate frames)
 - (d) 3-6 (make sure to include a sketch and assigned coordinate frames)
 - (e) For problem 3-6 pick a different convention that still has the first coordinate frame and last coordinate frame agree with the DH convention, and calculate the forward kinematics. Are these representations different? If so, how?
 - (f) 3-8 (make sure to include a sketch and assigned coordinate frames)
 - (g) Using the MATLAB Robotics Toolbox, select link lengths for the robot in 3-8 and represent the robot in software. Using forward kinematics, find an approximate way to determine the reachable workspace of the arm. The reachable workspace is the 3D space that the robot can reach, regardless of orientation of the end-effector at that point. Turn in your code and a plot of your visualization of the workspace. I'm not asking for a high spatial resolution solution, just an approximation. This is purposefully an open-ended problem.

For all of these problems you can use software to help you find the symbolic solutions. However, please make sure you know how to do it by hand.