MEAM 520—Lab 0

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Partners:

Due: Monday 1st June 2020

Problem 1

There are 5 degrees of freedom in the simulation robot disregarding the gripper.

Problem 2

Without the gripper the simulation robot has a (RRRRR) configuration.
With the gripper the simulation robot has a (RRRRRP) configuration.

Problem 3

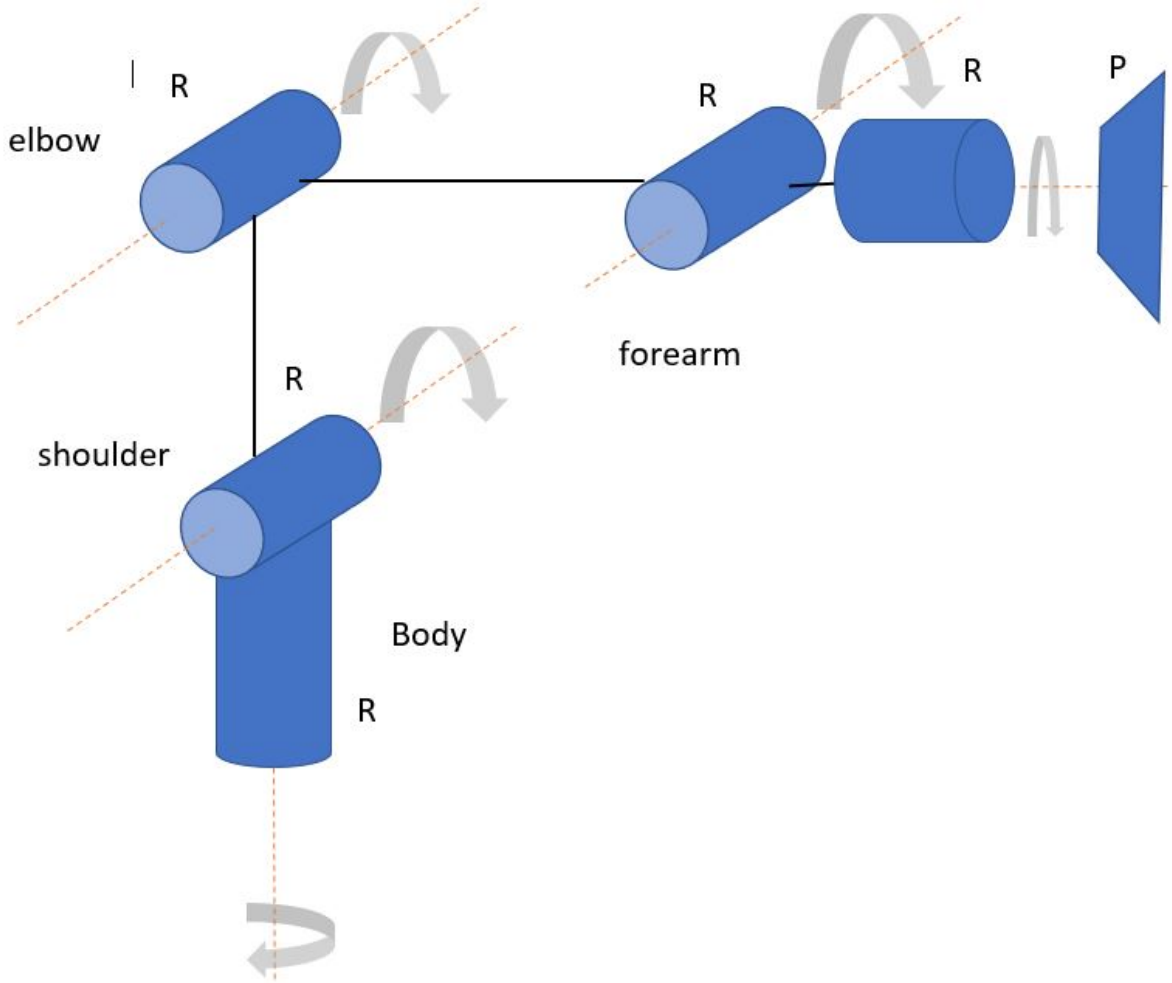

Figure 3.1: Diagram Showing the 3D symbolic representation of the robot in the zero configuration

Problem 4

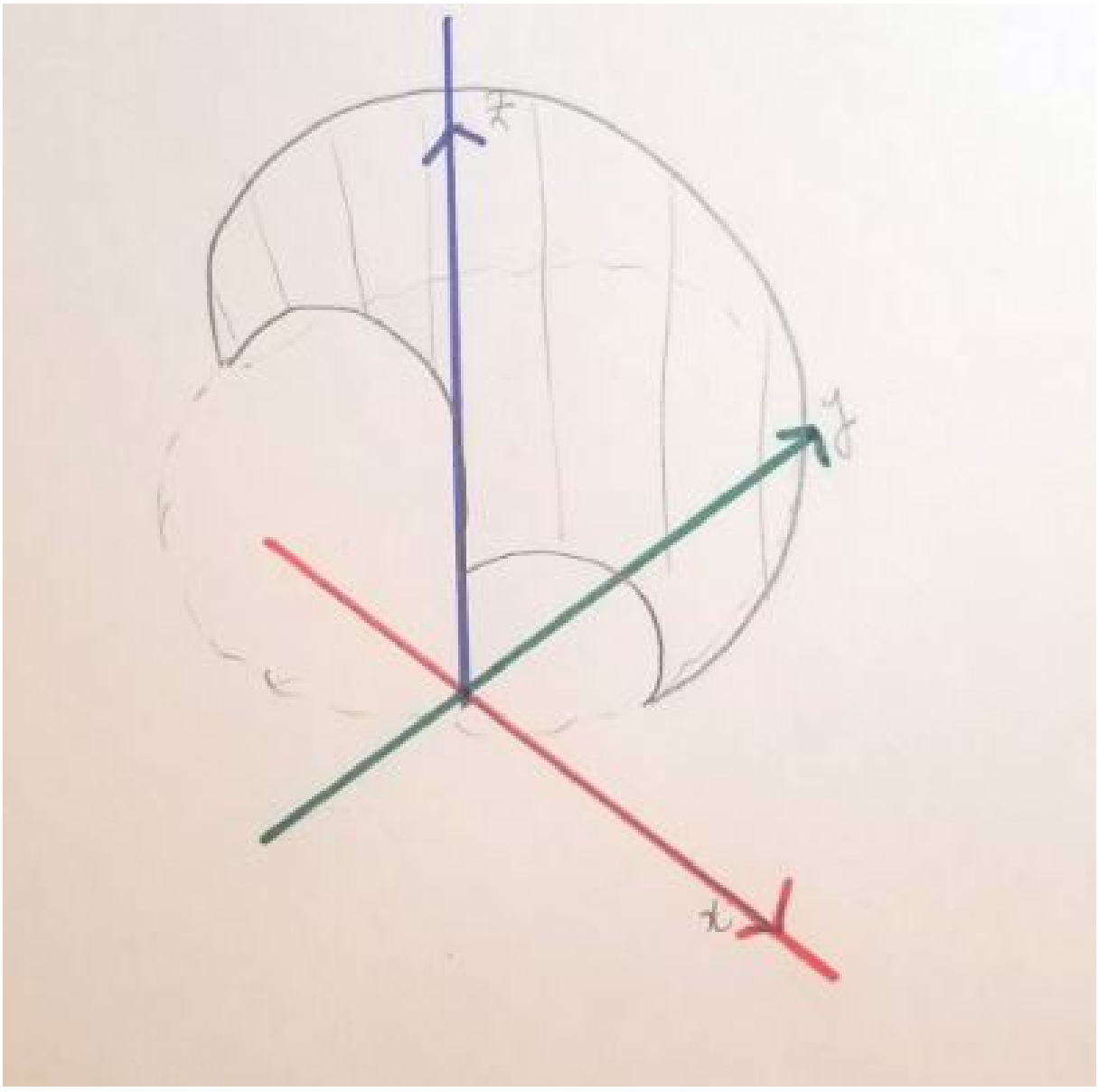

Figure 4.1: Diagram Showing the h the reachable workspace of the simulated robot

Problem 5

The end effector is pointing **up**

Problem 6

Joints = $[J_0, J_1, J_2, J_3, J_4, \text{Gripper}]$
for J_0 Lower Limit = -1.4, Upper Limit = 1.4
for J_1 Lower Limit = -1.2, Upper Limit = 1.4
for J_2 Lower Limit = -1.8, Upper Limit = 1.7
for J_3 Lower Limit = -1.9, Upper Limit = 1.7
for J_4 Lower Limit = -2.0, Upper Limit = 1.5
for Gripper Lower Limit = -15, Upper Limit = 30

Problem 7

Run `lab0_v3.py` with `q = [0,0,-np.pi/2,-np.pi/2,-np.pi/2,0]`

Problem 8

The stimulation models the movements of the robot for general values of q well. However, for values of q close to the upper an lower limit of each joint, the stimulation sometimes gives erroneous and unrealistic outcomes that actual robot wouldn't stimulate. For example, consider the value of `q = [0,0,1.7,1.7,0,0]`, we have the following configuration as shown in figure 8.1 stimulated by the robot. This can't physically happen with hardware. Furthermore, the movements of the stimulation is fast, at least, faster than the real robot. Penultimately, the stimulation doesn't account for the fact that the robot will deteriorate over time. Lastly, in the video it seems that certain joints in the robot rotated more than the theoretical limits found on the stimulation.

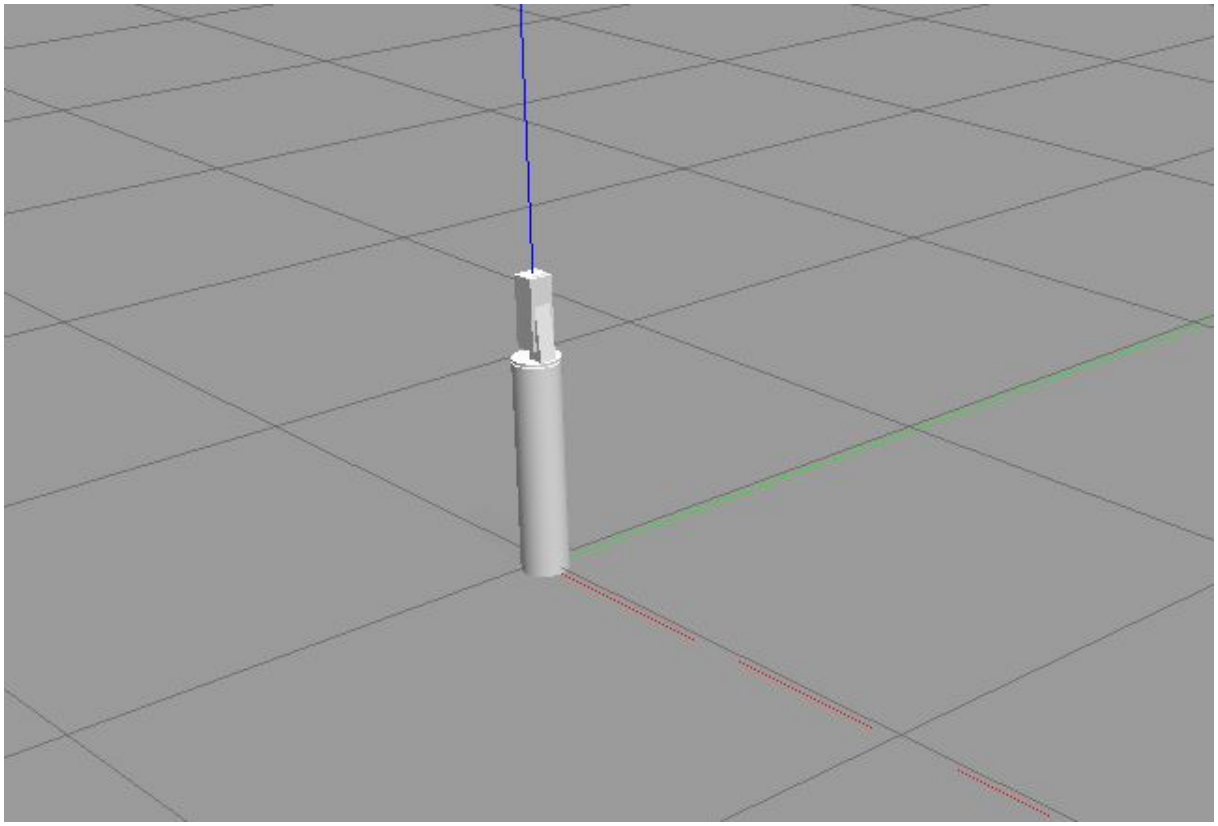

Figure 8.1: Diagram Showing the 3D symbolic representation of the robot in the for the aforementioned configuration