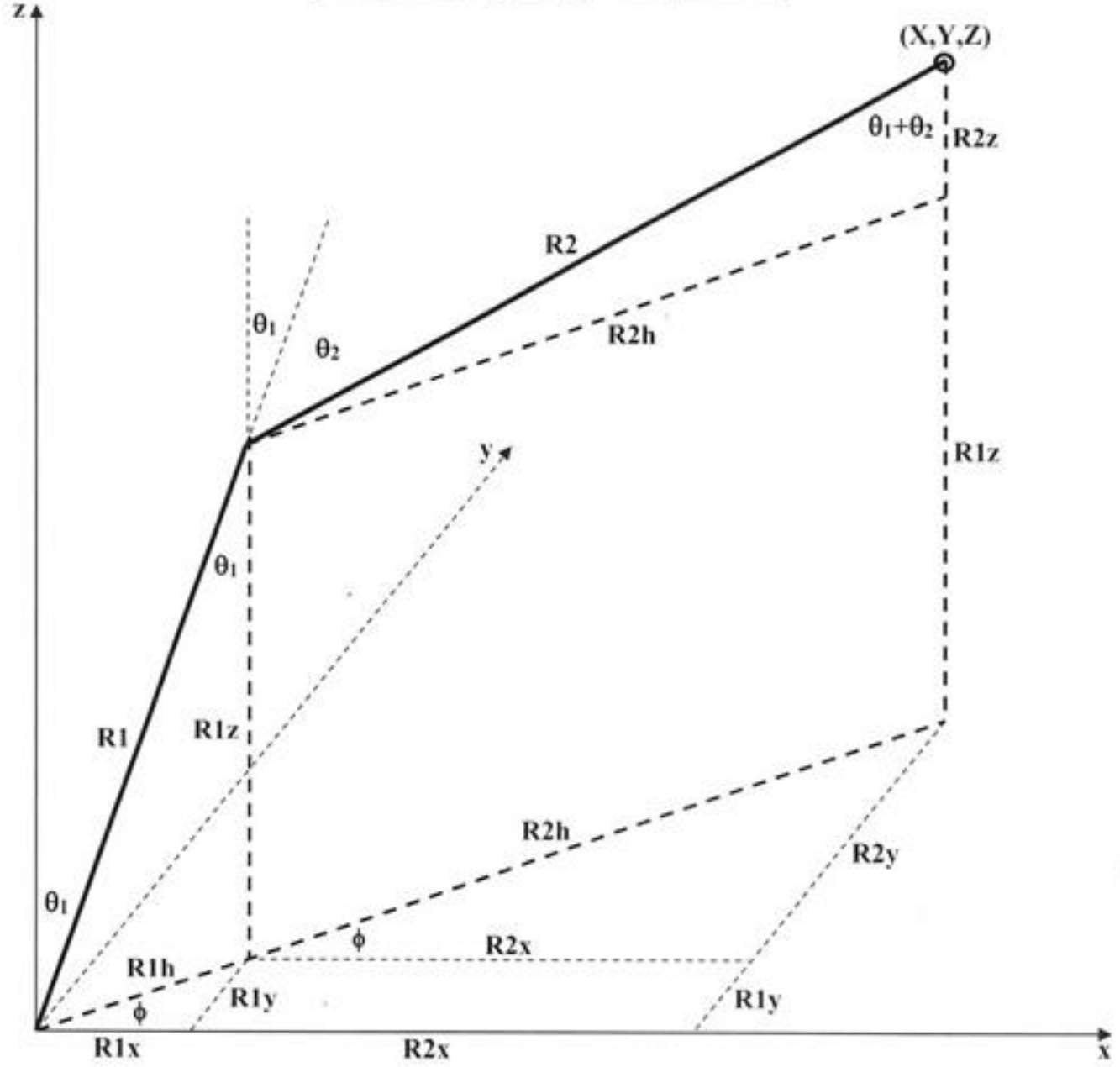
CSC 2262, Spring 2020, Lab 3

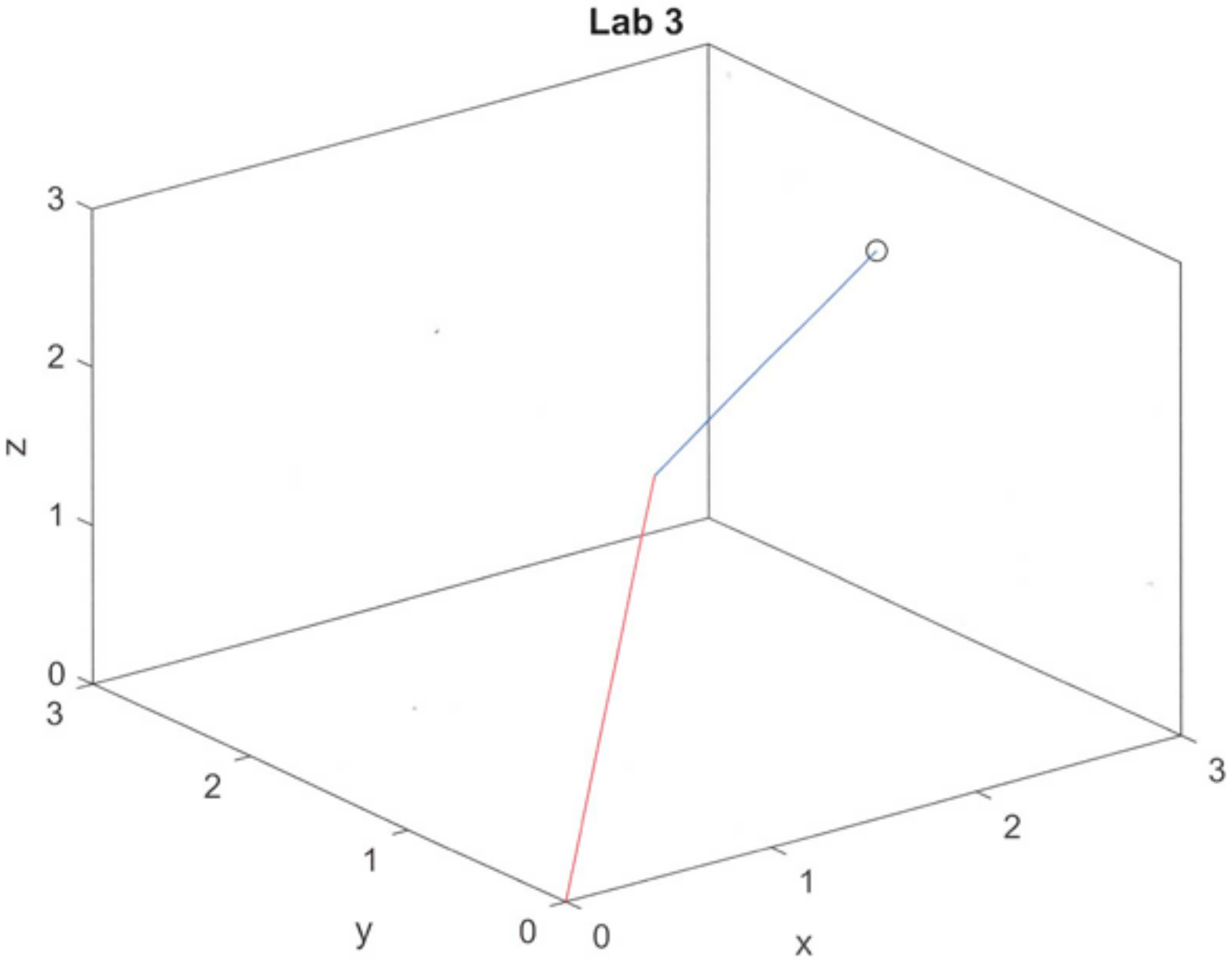


The robotic arm shown above consists of links R1 and R2, where R1=2.4 and R2=2.2 . R1, R2, and the z axis are all in the same plane. R1 makes an angle θ_1 with the z axis, R2 makes an angle θ_2 with the direction of R1, and the horizontal component of the arm makes an angle ϕ with the x axis. The arm needs to reach the point (X,Y,Z) where X=2.67 and Y=1.5 .

Write a MATLAB program as follows:

1) Z will go from 0 to 2.5 in steps of .01 .

2) For each value of Z, call the function newton3 to calculate θ_1, θ_2 and ϕ so that the end of the arm will be at the point (X,Y,Z). Use 20°, 70° and 30° as the initial guesses for θ_1, θ_2 and ϕ and 1e-7 as the accuracy factor. Plot the robotic arm, pausing .01 sec between each orientation. Pause an additional 8 sec after the first orientation. Choose the origin at the lower left corner. Plot R1 and R2 in red and blue and the point (X,Y,Z) as a black circle. The graph for the final orientation should look like the one on the attached sheet.


Lab 3
3
2
z
1
0
3
2
1
y
0
0
1
2
x
3