Homework 1

Problem 1

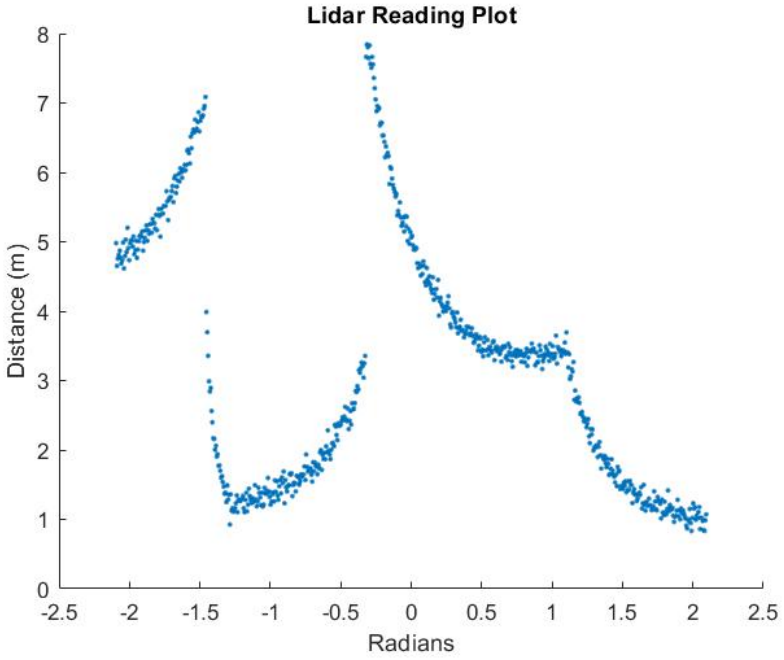

Figure 1: P1.1 Lidar Measurements

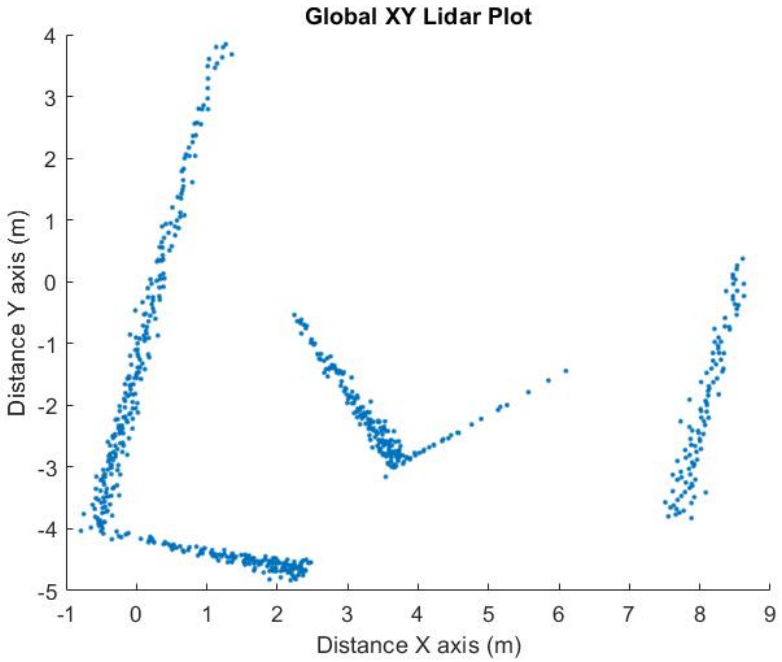

Figure 2: P1.2 Local Robot Plot of Lidar

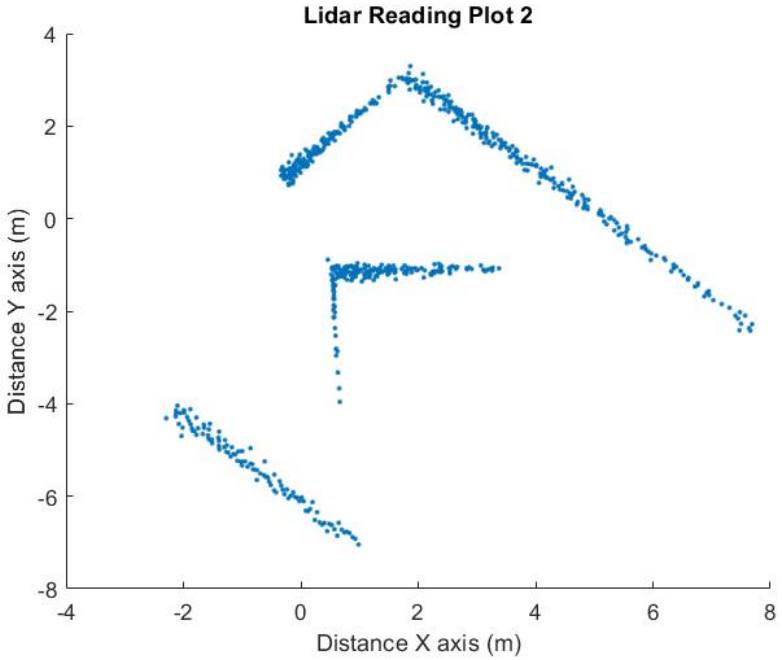

Figure 3: P1.3 Global Robot Plot of Lidar

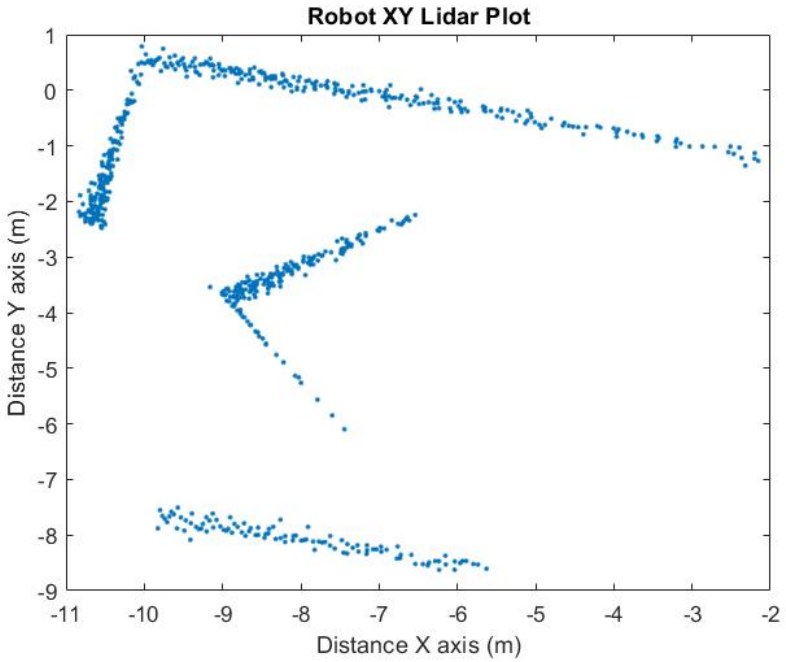

Figure 4: P1.3 Global to Robot Plot of Lidar

Problem 2

1) The turnInPlace program uses SetFwdVelAngVelCreate on line 78 to turn off the rotation of the robot after the variable noRobotCount is at least 3 which indicated the overhead localization loses the robot for too long. To do this, the program sends the port number and followed by two 0's. SetFwdVelAngVelCreate takes in the robot port number, the desired robot velocity in meters per second, and the angular velocity of the robot in radians per second.

2) See code for limitCmds.m

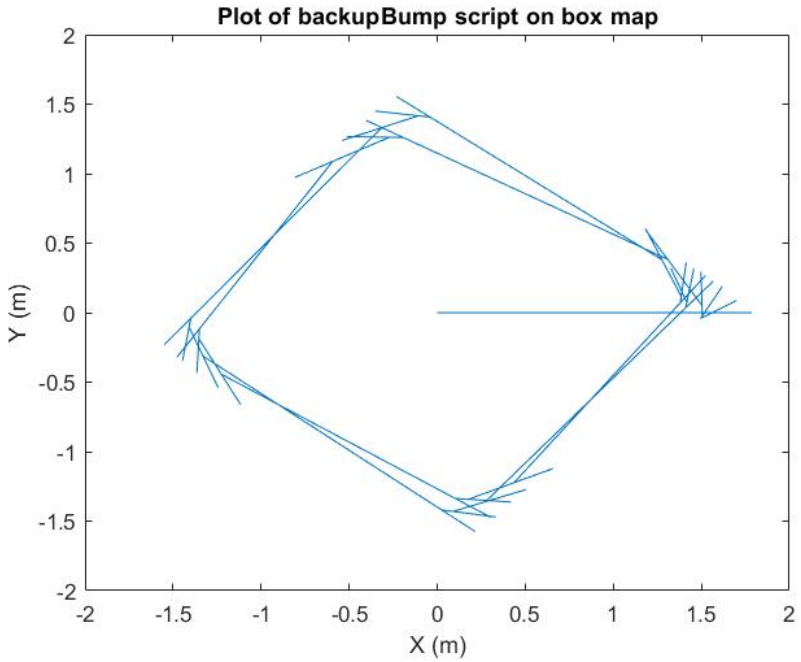

Figure 5: P2.3 Plot of backupBump Program

4) This program starts off moving forward until it detects a collision with the bump sensors. Once detected, the robot backs up .25 m, rotates 70 degrees, and goes along a curved path that in this case follows the wall.

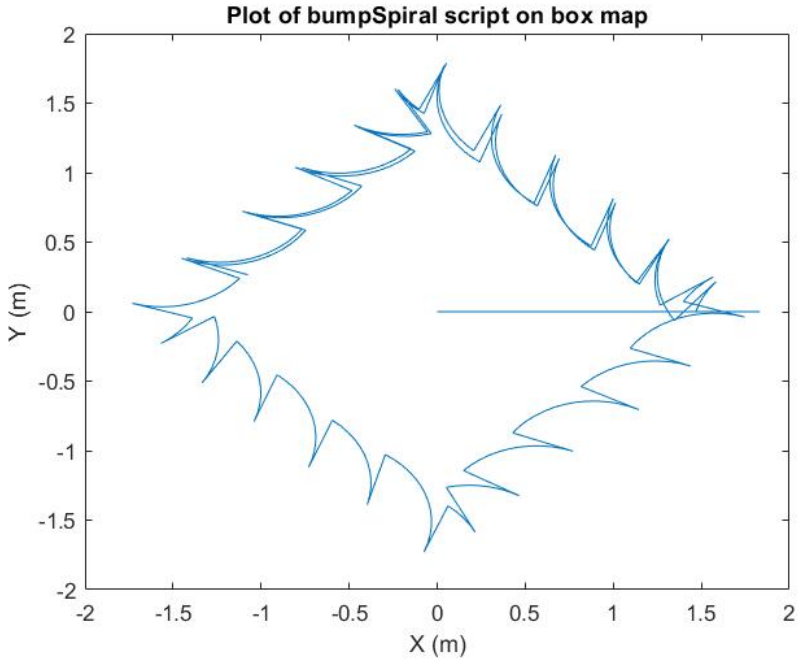

Figure 6: P2.3 Plot of bumpSpiral Program

Problem 3

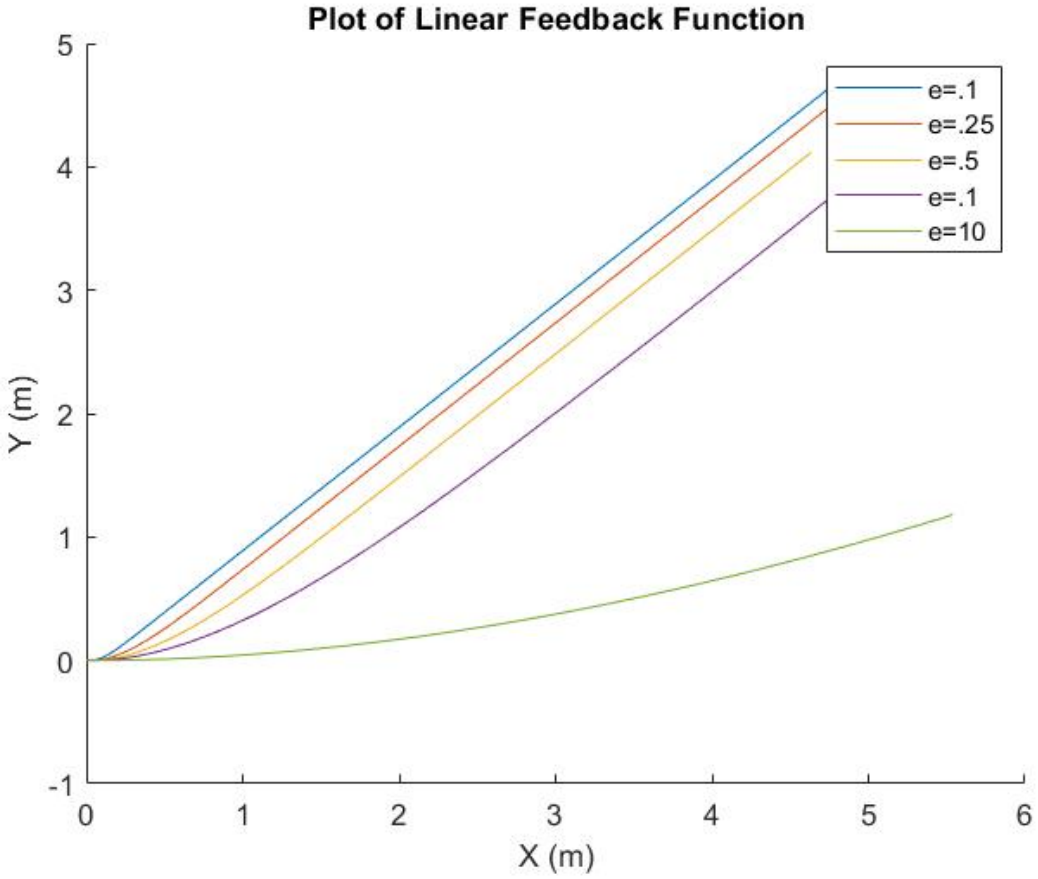

Figure 7: P3.2 Linear Feedback Control At Different ϵ

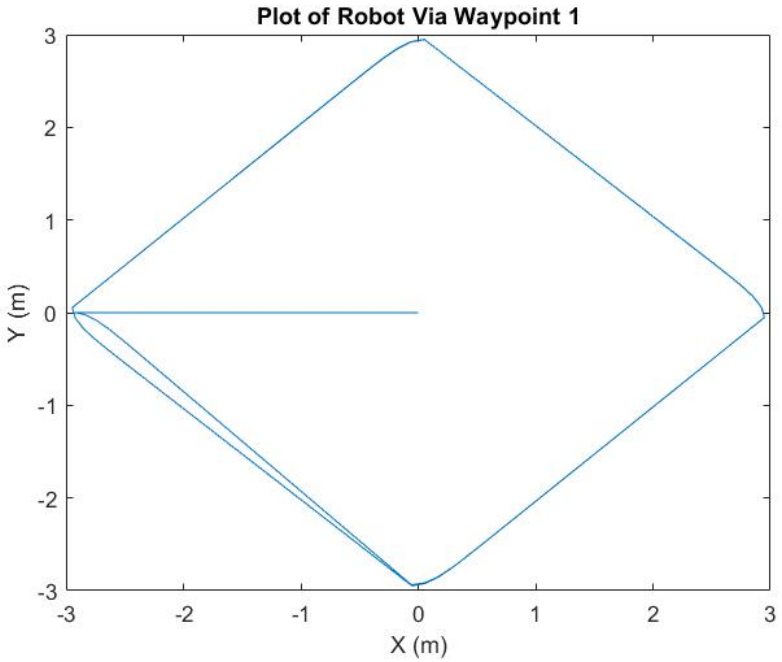

Figure 8: P3.4 Plot of Waypoint 1

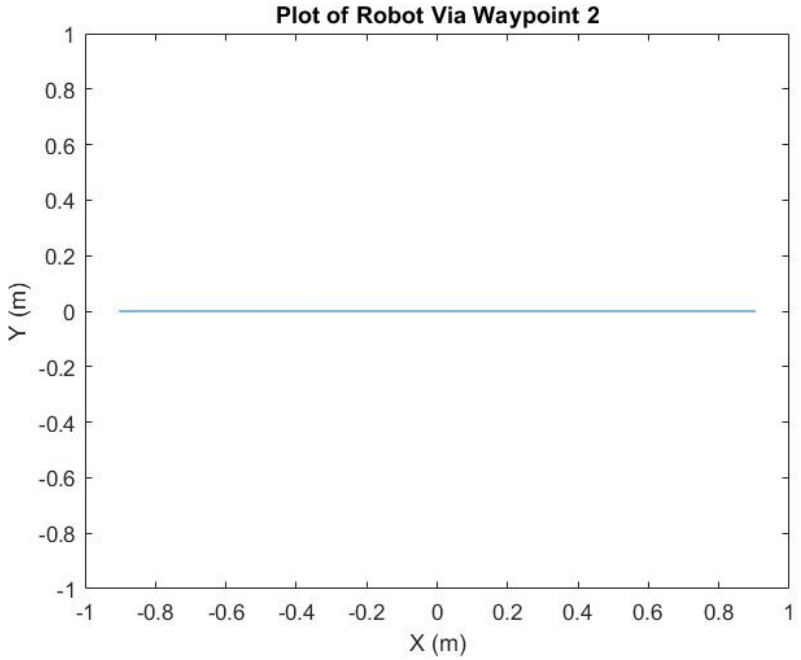

Figure 9: P3.4 Plot of Waypoint 2

5) The program "TestFunHw1" is a program to test each of our functions to make sure it works with a larger dataset. We are able to put our own function calls in case we had any different syntax than the graders would expect :). Specifically, I realized that in my feedbacklin function I did had pose as an input, while there is no actual need for it in the function. In the test program, I put [0,0,theta] as the input for pose to allow the function to work. In the future I may remove it, but currently it would mess up my other function calls.

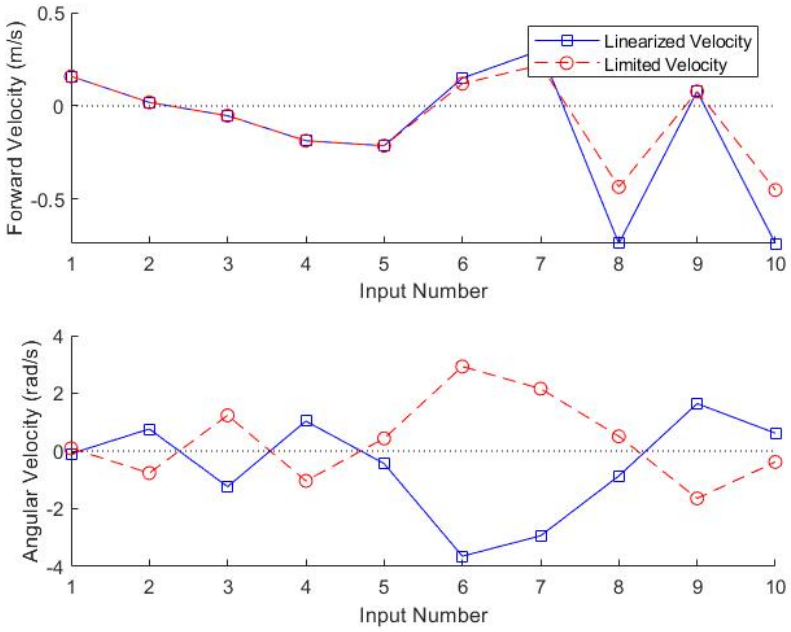

Figure 10: P3.5 Plot of HWFUN Program with our Given Data Set