EE 5325/4315 Robotics
Homework for Spring 2023

Updated: Feb. 13, 2023

DO NOT DO HOMEWORK UNTIL IT IS ASSIGNED.
THE ASSIGNMENTS MAY CHANGE UNTIL ANNOUNCED

- For full credit, show all work.
- Some problems require hand calculations. In those cases, do not use MATLAB except to check your answers.

It is OK to talk about the homework beforehand.

BUT, once you start writing the answers, MAKE SURE YOU WORK ALONE.

The purpose of the Homework is to evaluate you individually, not to evaluate a team.

Cheating on the homework will be severely punished.
DO NOT find solutions online and hand them in as your own work. This called plagiarism. Faculty who plagiarizes the papers of others get fired.

The next page must be signed and turned in at the front of ALL homeworks submitted in this course

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EE 5325/4315 Robotics
Spring 2023
Homework Pledge of Honor

On all homeworks in this class - YOU MUST WORK ALONE.

Any cheating or collusion will be severely punished.
It is very easy to compare your software code and determine if you worked together.
It does not matter if you change the variable names.

Please sign this form and include it as the first page of all of your submitted homeworks.

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Typed Name: _____

Pledge of honor:

"On my honor I have neither given nor received aid on this homework."
Signature: _____

EE 5325/4315 Homework 1
Spring 2023
Computer Simulation, Inverse Kinematics, Jacobian

1. Simulate the van der Pol oscillator $y''+\alpha(y^2-1)y'+y=0$ using MATLAB. Make 2-D plot of t vs. y(t). Make 2-D plot of t vs. y'(t). Make 3-D plot of t, y(t), y'(t). Also plot the phase plane 2-D plot of y'(t) vs. y(t). Use y(0)= -0.1, y'(0)= 0.1.
    a. For α= 0.5.
    b. For α= 1.5.

2. Do MATLAB simulation of the Lorenz Attractor chaotic system. Run for 50 sec. with all initial states equal to 0.5. Plot states versus time, and also make 3-D plot of x_1, x_2, x_3 using PLOT3(x1,x2,x3).

$$\dot{x}_1 = -\sigma(x_1 - x_2)$$
$$\dot{x}_2 = rx_1 - x_2 - x_1x_3$$
$$\dot{x}_3 = -bx_3 + x_1x_2$$

use σ= 15, r= 28, b= 8/3.

3. Find the inverse kinematics for the two-link polar arm.

4. Find the Jacobian for the two-link polar arm.