Assigned: 2/11/21
Due: 2/18/21 @ 11:59 pm

Name: _____ ID: _____

1.) Please consider the differential equation below:

$$\frac{d^2y}{dt^2} + 6\frac{dy}{dt} + 5y = u$$

a) (10 pts) Obtain the transfer function $Y(s)/U(s)$ for this system.

b) (10 pts) Find the free response of this differential equation analytically using Laplace transform with initial conditions: $y(0) = 1$ and $\dot{y}(0) = 0$. Please plot the response for 10 seconds using MATLAB.

c) (10 pts) Plot the free response to this differential equation by numerical solution using MATLAB. Compare graphically this numerical solution to the analytical solution in (a).

Name: _____ ID: _____

2.) (10 pts) Please solve Problem B-3-6 from Ogata (page 98).

Assigned: 2/11/21
Due: 2/18/21 @ 11:59 pm

Name: _____ ID: _____

3.) (10 pts) Please solve Problem B-3-9 from Ogata (page 99), except for the analogous mechanical system.

Name: _____ ID: _____

4.) (10 pts) Please find the inverse Laplace transform of:

$$G(s) = \frac{2s + 4}{s^2 + 6s + 10}$$

Name: _____ ID: _____

5.) (10 pts) Please find the inverse Laplace transform of:

$$G(s) = \frac{s^2 + s + 2}{(s+1)^3}$$