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HW: MATLAB Project 2
Class: ME 3017 Dr Cowan

Problem 1

a. Equations of Motion ->
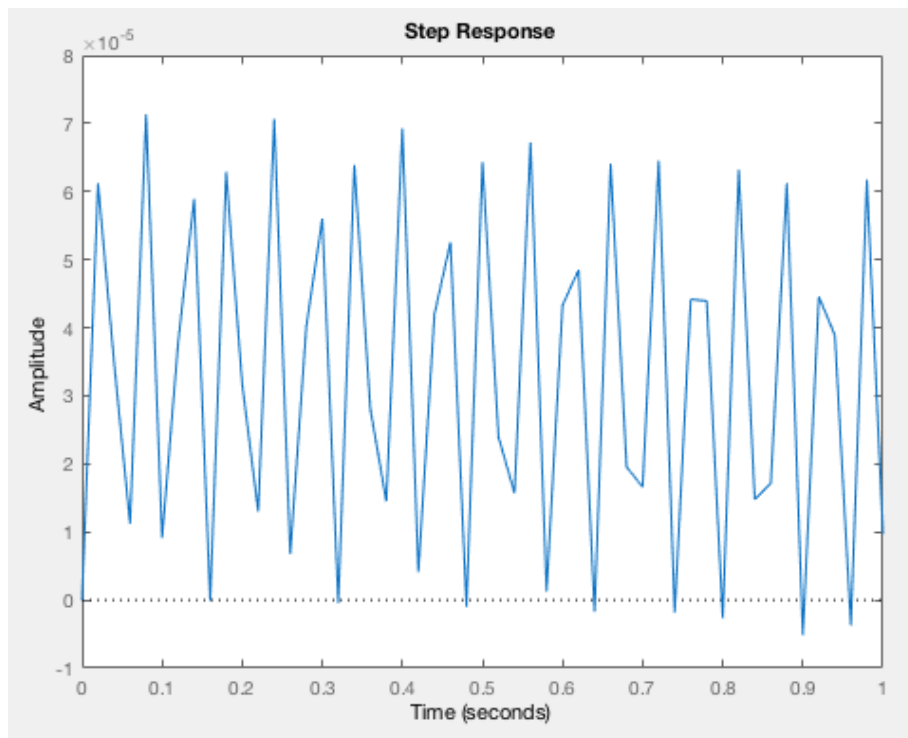$$m_1 \ddot{x}_1 = f - k_1 x_1 - k_2(x_1 - x_2) \rightarrow 2\ddot{x}_1 = f - 1.4e4(2x_1 - x_2)$$
$$m_2 \ddot{x}_2 = -k_3 x_2 - k_2(x_1 - x_2) \rightarrow \ddot{x}_2 = -1.4e4 x_1$$

b. Transfer Function ->
$$X_1(s) / F(s) = s^2 /(2s^4 + 2.8e4s^2 + 1.4e4)$$

c. Code and Plot ->
```
sys1= ([1 0 0], [2 0 2.8e4 0 1.4e4]);
t = (0:.02:1);
step(sys1, t);
```


d. Plot Characteristics -> Sharp peaks would be an undesirable characteristic. Damping would smooth the peaks.

Problem 2

a. Functions ->

$$f(t) = Au_s(t - t_1) - Au_s(t - t_2)$$

$$F(s) = (A/s)e^{-t1s} - (A/s)e^{-t2s}$$

b. Time Response -> 0
>> f = (sqrt(125)*(1e100/s)*(exp(-0*s)-exp(-0*s)))/(s^2+10*s+125);
>> ilaplace(f)
ans = 0

c. Plot -> 0 amplitude vs t

d. Plot ->
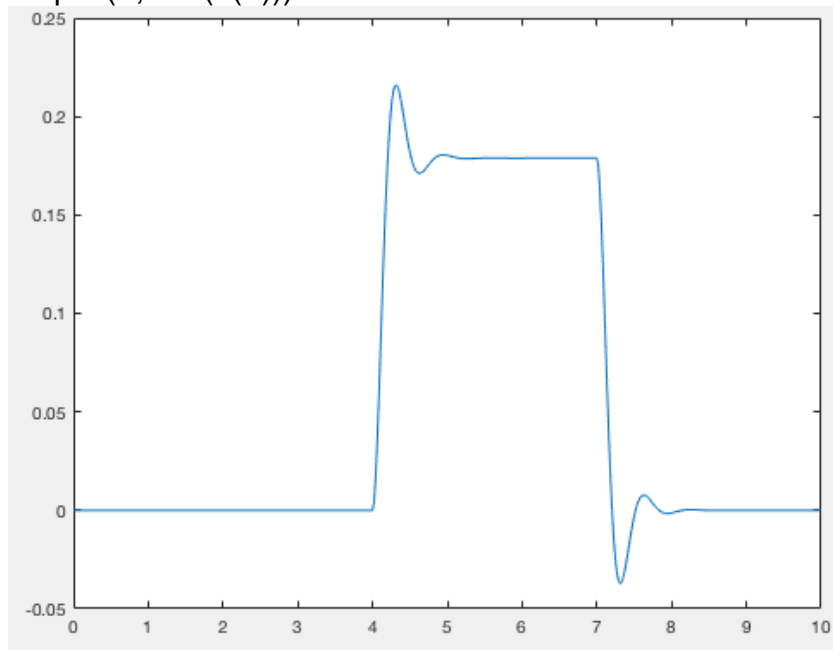>> f1 = (2/s)*(exp(-4*s)-exp(-7*s));
>> f = (sqrt(125)*f1)/(s^2+10*s+125);
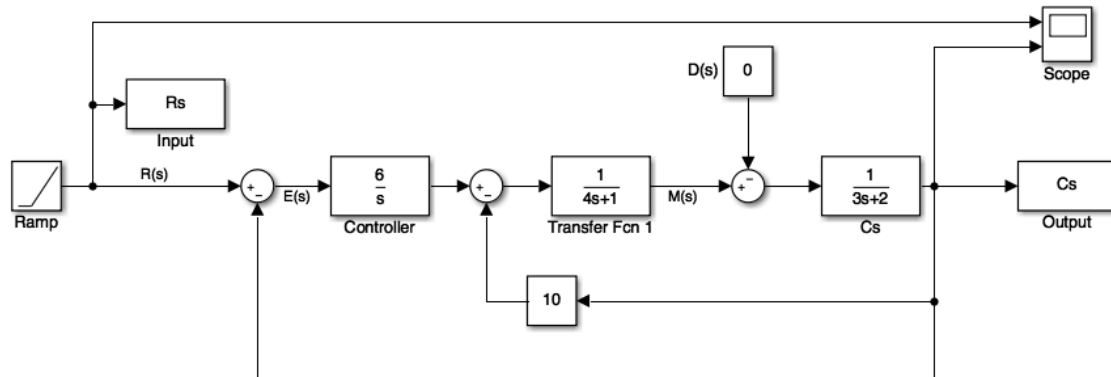>> x = ilaplace(f);
>> syms t
>> tf = symfun(x, t);
>> T= (0:.02:10);
>> plot(T,eval(tf(T)))

Problem 3

Block Diagram

R(s) and C(s) Plot vs time