University of Wisconsin-Madison
Department of Electrical and Computer Engineering
ECE 332 - Feedback Control Systems, Fall Semester 1998
Problem Set #2

Distributed: Friday, September 11

Due: Friday, September 18 (in class)

As with HW 1, these problems will make use of material in Dorf, through section 2.6

From Dorf, Chapter 2, **Exercises**

E2.25 - Clearly, the text already provides the solution; you must therefore carefully describe your approach in verifying this solution. You are free to perform direct calculation based on the mechanical equations, or convert to an equivalent circuit.

From Dorf, Chapter 2, **Problems**

P2.6 - Note that the input voltage, v(t) is zero, and hence replaced by a short-circuit. Therefore, you are finding a solution due only to initial conditions. *Hint:* You may consider the following possible approach (this is by no means the **only** possible approach): once *v(t)* is set to zero, the circuit may be viewed as a parallel connection of three "legs;" two RC series legs, and one RL series leg. Write a differential equation for the node voltage at the top of the circuit, based on KCL at that node, and solve for (the Laplace transform of) that voltage. Your answer may then be easily related to desired answer for $I_2(s)$. Note that the question only asks for the Laplace transform of the current; you do not have to solve for the associated time function.

P2.8 - Hint: you may find some of the algebra easier if you do your initial calculations using parameters of conductance ($G = 1/R$) for the resistive elements, and convert back to resistance parameters only as a final step in writing the transfer function.

P2.34 - Based on the material through section 2.6, you may solve this problem via successive loop reduction. If you wish to be ambitious, using material from 2.7 (which we may not yet have reached in lecture), this problem is also solvable via Mason's rule.