ECE-205 : Dynamical Systems

Homework #3

Due : <u>Tuesday</u> December 14 at the beginning of class

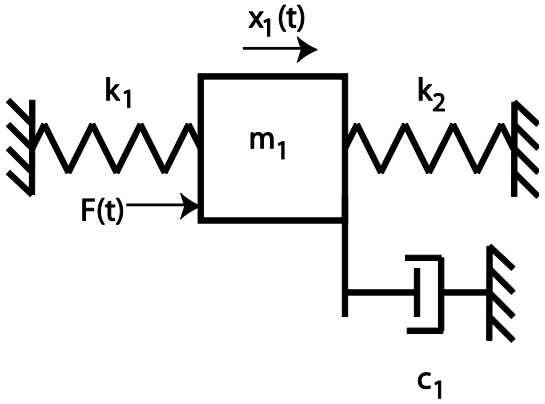
<u>Exam 1, Thursday December 16</u>

1) Problem 3.3 (From the Notes)

2) Problem 3.5 (From the Notes)

3) Problem 3.6 (From the Notes)

4) (Pre-Lab, this is part of the homework) Consider the following one degree of freedom system we will be utilizing this term:



a) Draw a free body diagram of the forces on the mass.

b) Show that the equations of motion can be written:

$$m_1\ddot{x}_1(t)+c_1\dot{x}(t)+(k_1+k_2)x_1(t)=F(t)$$

or

$$\frac{1}{\omega_n^2}\ddot{x}_1(t)+\frac{2\zeta}{\omega_n}\dot{x}_1(t)+x_1(t)=K\,F(t)$$

c) What are the damping ratio ζ, the natural frequency ω_n, and the static gain K in terms of m_1, k_1, k_2, and c_1?