ECEN 3723 Systems I
Spring 2003
Midterm Exam #2

Choose any four out of five problems.
Please specify which four listed below to be graded:
1)_____; 2)_____; 3)_____; 4)_____; 5)_____

Name: ________________________________

Student ID: ________________________________

E-Mail Address: ________________________________
Problem 1:
Consider the electric circuit shown below. Using the force-current analogy to derive an analogous mechanical system. Show the detailed procedure and the resulted mechanical diagram.
Problem 2:
Evaluate $\lim_{k \to \infty} \sum_{i=0}^{k} i e^{-2i}$. 
Problem 3:
Find \( x(k) \), the inverse z-transform of \( X(z) = \ln \left( \frac{2z}{2z-1} \right) \).
Problem 4:

Given $z$ transform of $k^5 5^k u(k)$ is $X(z)$, find the $y(k)$, such that $Y(z) = \frac{1}{z} X(2z)$. 
**Problem 5:**
The input \( x(k) = u(k) - 2u(k - 2) + u(k - 4) \) is applied to a linear time-invariant discrete-time system. The resulting response with no initial energy is \( y(k) = ku(k) - ku(k - 4) \). Determine the impulse response function of the system, \( h(k) \).