EE 3120   Exam II   Section 1   March 15, 2002
                                                         7:40-8:30 am.

Note:

1. Closed Book and notes. **Calculators can not be used during the test.**

2. At the top of your paper write the **Section Number** that appears at the top of this page.

3. Please attempt each problem on a **new page** and only write on **one side** of the page.

4. Show all your work for more rational grading.

5. Justify all your answers.

Problem 1 (30 points)

A linear time-invariant system produces output $y(t) = (1 - e^{-2t})q(t)$ in response to the input $u(t) = q(t)$.

1. Find the impulse response of the system.

2. Find the system response when the input is the ramp function $r(t) = tq(t)$.

Problem 2 (25 points)

The impulse response of a linear time-invariant system is given by $h(t) = q(t) - q(t-2)$. Use the method of graphical computation of convolution to find and Sketch the output of the system, $y(t)$, when the input is given by $u(t) = q(t-1) - q(t-2) + q(t-4)$.

Problem 3 (45 points)

A linear time-invariant system is described by the following differential equation.

$$\ddot{y}(t) + 5\dot{y}(t) + 4y(t) = u(t) - \dot{u}(t)$$

where $y(0^-) = 1$, $\dot{y}(0^-) = 2$, and $u(t) = e^{-t}q(t)$ with $u(0^-) = 0$.

1. Find the zero-state response of this system.

2. Identify the transfer function of this system.

3. Find the zero-input response of the system.

4. Find the total response of the system.