EE 3120   Exam II   Section 2   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 (25 points)

A linear time-invariant system produces output $y(t) = (te^{-3t} + e^{-2t})q(t)$ for input $u(t) = e^{-3t}q(t)$.

1. Find the impulse response of the system.

2. Find the response of the system for input $q(t)$.

Problem 2 (30 points)

The following differential equation describes a linear time-invariant system.

$$\dot{y}(t) + 4y(t) = 2u(t)$$

1. Find the transfer function of this system.

2. Find the system output for the input $u(t) = tq(t)$.

3. Suppose $y(0^-) = 100$ and the input $u(t) = 0$ is applied. Find the output.

Problem 3 (20 points)

The impulse response of a linear time-invariant system is given by

$$h(t) = q(t) - 2(q(t-1) + q(t-2).$$

Using the graphical method of convolution, find the system response for the input $u(t) = q(t) - q(t-2)$.

Problem 4 (25 points)

Briefly explain why we are interested in Laplace transform. To get full credit you should back up your argument with notation and concepts from linear time-invariant systems.

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