O K L A H O M A S T A T E U N I V E R S I T Y

SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING

ECEN 3723 Systems I
Spring 2001
Midterm Exam #1

Name : _____

Student ID: _____

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Problem 1:

Evaluate the following integrals involving delta function:

a) $\int_{-\infty}^{\infty} e^{-t}u(\lambda-2)\delta(\lambda-t)\delta(\lambda-1)d\lambda$

b) $\int_{-\infty}^{\infty} e^{jwt}\delta(\frac{t}{2}-1)dt$

Problem 2:

a) Find the Laplace transform of
$\cos(t-2)e^{-t}u(t-1)$

b) Find the Inverse Laplace transform of
$\ln\frac{s+a}{s+b}$

Problem 3:

A continuous-time signal $x(t)$ has the Laplace transform

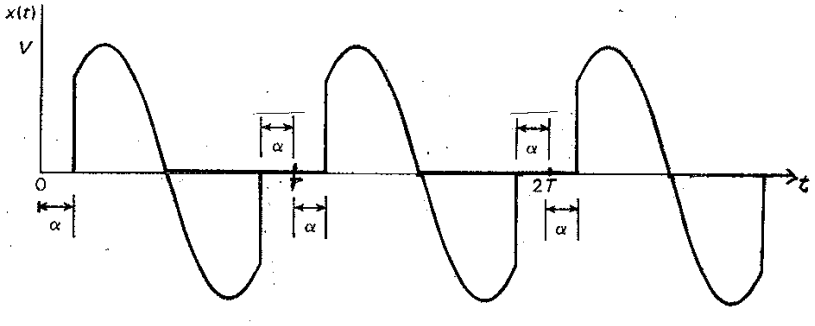
$$X(s) = \frac{s+1}{s^3 + 3s^2 - 5s - 7},$$

determine the Laplace transform $V(s)$ for

$$v(t) = x(t)\cos 5t\,.$$

Problem 4:

Determine the Laplace transform of the following signal, $x(t)$, with an infinite number of chopped sinusoidal waves.



Problem 5:

A continuous-time system is defined by the following differential equation

$$\frac{d^2y(t)}{dt^2} + 5\frac{d^2x(t)}{dt^2} - \frac{dy(t)}{dt} + 3y(t) - 2x(t) = 0,$$

where $x(t)$ is the input and $y(t)$ is the output of the system. Compute the response, $y(t)$, for all $t \geq 0$, when $y(0^-) = -2$, $\dot{y}(0^-) = 1$, and $x(t) = r(t) = tu(t)$.