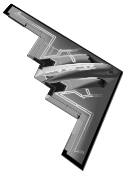
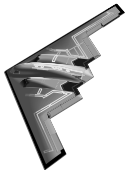
O K L A H O M A S T A T E U N I V E R S I T Y

SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING



ECEN 3723 System Dynamics
Fall 2012
Midterm Exam 1
October 9, 2012



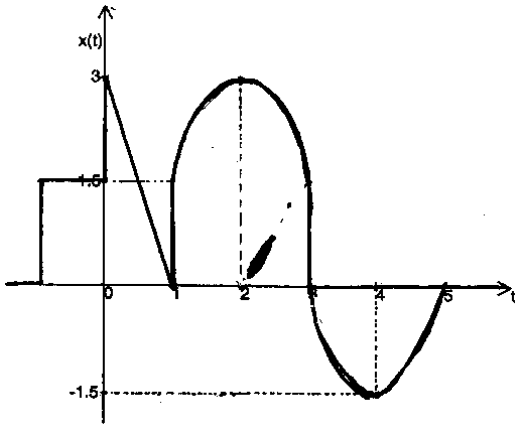
Choose any four out of five problems.
Please specify which four listed below to be graded:
1)_____; 2)_____; 3)_____; 4)_____;

Name : _____

E-Mail Address:_____

Problem 1:

Describe the following signal, $x(t)$, in terms of some basis functions (e.g., step, impulse, ramp or sinusoidal).



Problem 2:

a) Find the Laplace transform of

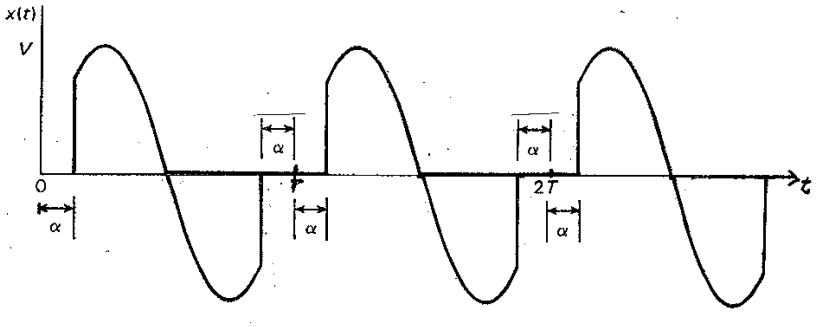
$$\int_0^t e^{-2\lambda} \cos(\omega\lambda + \theta) d\lambda \text{ , and}$$

b) Find the Inverse Laplace transforms of

$$e^{-4s} \ln \frac{s+a}{s+b}.$$

Problem 3:

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



Problem 4:

A continuous-time signal

$$x(t) = e^{-2t} \sin 3t u(t)$$

has the Laplace transform $X(s)$. Determine the inverse Laplace transform of $V(s)$, $v(t)$, where

$$V(s) = \frac{e^{-5s} + e^{5s}}{2} X(s).$$

Problem 5:

A continuous-time system is defined by the input-output differential equation

$$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = 2\frac{d^2x(t)}{dt^2} - 4\frac{dx(t)}{dt} - x(t),$$

determine the response, $y(t)$, for all $t \geq 0$, when

$y(0^-) = -2$, $\dot{y}(0^-) = 1$, and $x(t) = u(t)$.