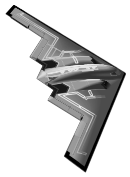
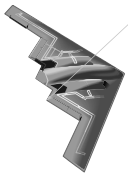
O K L A H O M A S T A T E U N I V E R S I T Y

SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING



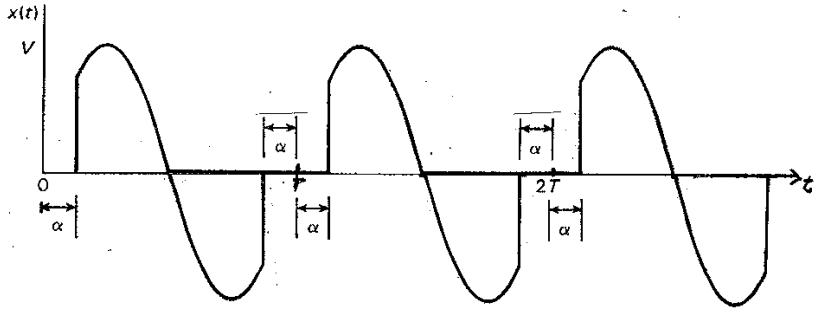
ECEN 3723 Systems I
Fall 2002

Midterm Exam #1



Problem 1:

a) Express the signal $x(t)$ in terms of some basic functions (note that $V_1 \neq V_2$).



b) Evaluate the following integral involving the impulse functions

$\int_{-2}^{2} (e^{-t}u(\lambda)\delta'(\lambda-1) + \sin(t-\lambda)\delta(\lambda-3))d\lambda$.

Problem 2:

Find the Laplace transforms of

a) $\int \cos(\omega t + \theta)dt$, and

b) $\sin te^{-2t}u(t-1)$.

Problem 3:
Find the Inverse Laplace transforms of

a) $\dfrac{s^2 e^{-2s}}{(s+1)(s^2+2s+2)}$, and

b) $\ln \dfrac{s+a+c}{s+b+c}$.

Problem 4

Problem 5:

For a system described by the state space representation given as

$$\dot{x}_1(t) = x_2(t)$$

$$\dot{x}_2(t) = x_3(t)$$

$$\dot{x}_3(t) = 4x_1 - 2x_2 + 2x_3 + e^{2t}$$

$$y(t) = 2x_1(t) - x_2(t)$$

with zero initials ($x_1(0) = 0$, $x_2(0) = 0$ and $x_3(0) = 0$). Find $y(t)$.