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

S C H O O L O F E L E C T R I C A L A N D C O M P U T E R E N G I N E E R I N G

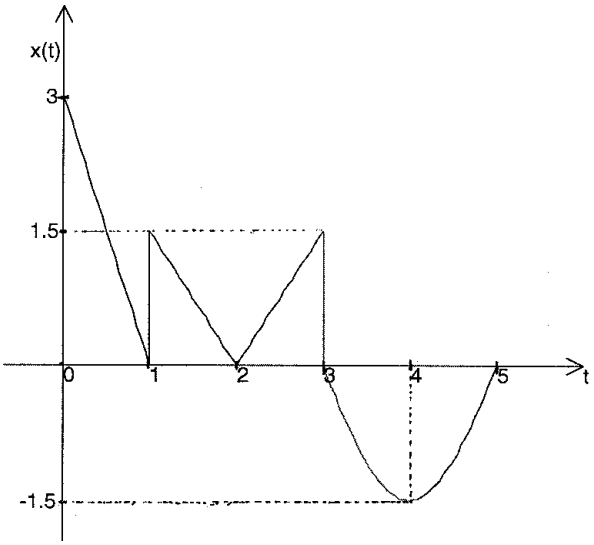
ECEN 3723 Systems I
Spring 1999
Midterm Exam #1

Name : _____

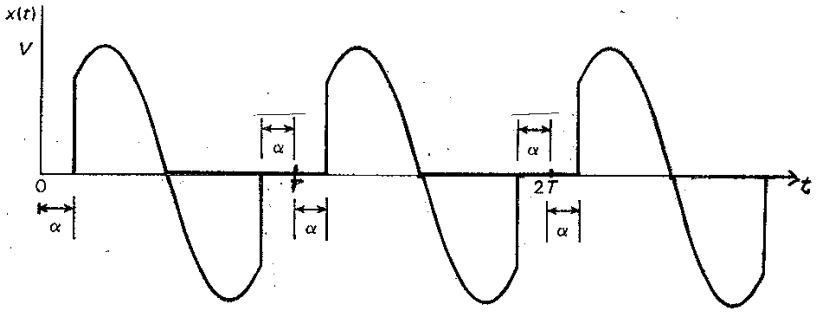
Student ID: _____

E-Mail Address:_____

Problem 1: (*Signal Representation*)
Describe the following signal, $x(t)$, in terms of some basis functions (e.g., step, impulse, ramp or sinusoidal):



Problem 2: (*Laplace Transform*)
Determine the Laplace transform of the following signal, $x(t)$, with only *three* periods (cycles).

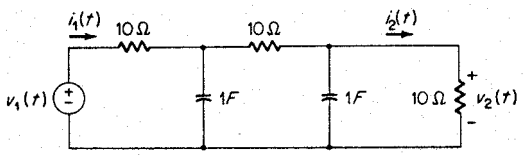


Problem 3: (*Laplace Transform Theorem*)
Consider a function $x(t)$. Show

$$\dot{x}(0) = \left.\frac{dx(t)}{dt}\right|_{t=0} = \lim_{s\to\infty}\left[s^2 X(s) - sx(0)\right].$$

Problem 4: (*Transfer Function*)
For the circuit shown below, find the transfer function defined below

$$H_2(s) = \frac{I_2(s)}{V_1(s)}.$$



Problem 5: (*Analogous System*)
Determine an analogous electrical circuit for the mechanical system shown below, where $p(t)$ is the force input to the system.