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 2000
Midterm Exam #1

CHOOSE ANY 4 PROBLEMS OUT OF 5

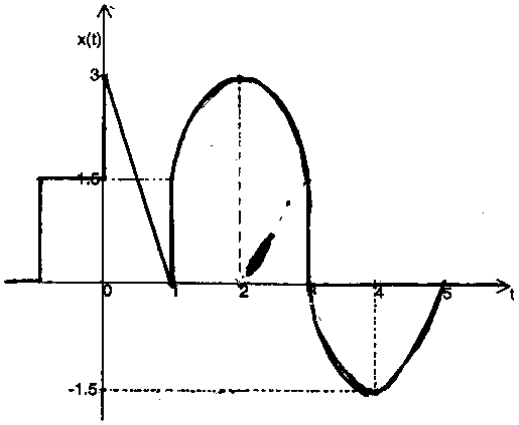
Name : _____

Student ID: _____

E-Mail Address:_____

Problem 1:

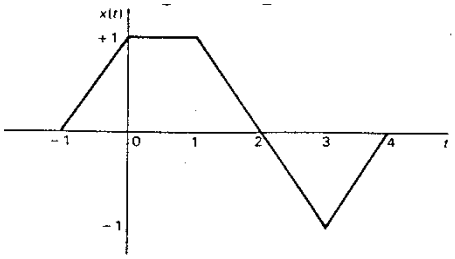
a) Describe the following signal, $x(t)$, in terms of some basis functions (e.g., step, impulse, ramp or sinusoidal).



b) Make the labeled sketch of

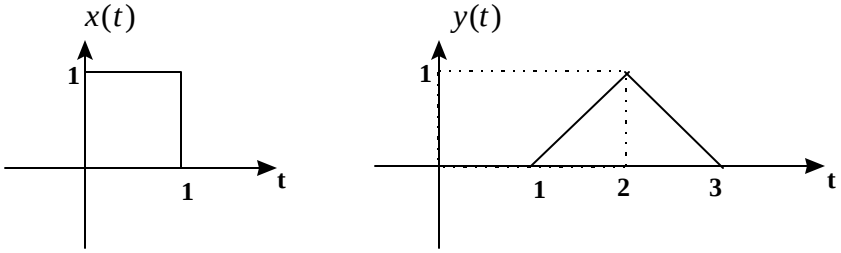
$$y(t) = 3 - 3x(2 - 4t)$$

based on a given continuous time signal, $x(t)$, show below.



Problem 2:

A system is found to have zero-state response, $y(t)$, when the input, $x(t)$, is applied. Is this system a) causal, b) time-varying, c) zero-memory, and/or d) zero-state linear ? Justify your answer. (hint: find how $x(t)$ and $y(t)$ are related, then proceed as usual)



Problem 3:

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

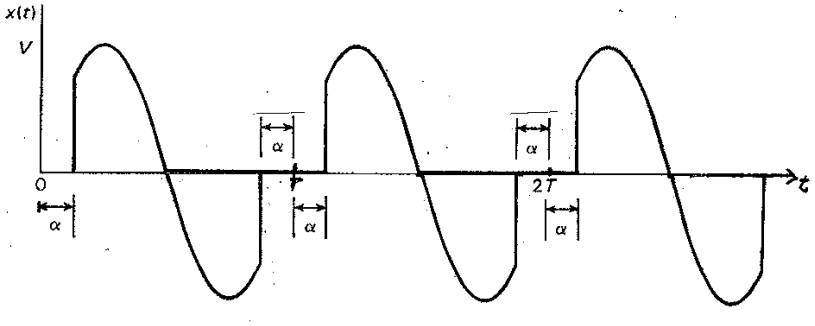
$$X(s) = \frac{s+1}{s^2 + 5s + 7},$$

determine the Laplace transform $V(s)$ for

$$v(t) = x(t)sin2t\,.$$

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 input-output differential equation

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

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

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