GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical Engineering

Quiz #1

Date: April 27, 1999 Course: EE 2201B

Name: _____
Last, First

- Closed book, closed notes, but one $8\frac{1}{2}'' \times 11''$ handwritten sheet is allowed. One hour and twenty minute time limit.
- None of the problems require involved calculations. Reconsider your approach before doing something tedious.
- All work should be performed on the quiz itself. If more space is needed, use the backs of the pages.
- This quiz will be conducted under the rules and guidelines of the Georgia Tech Honor Code and no cheating will be tolerated.

Problem	*Score*
1	
2	
3	
4	
Total	

Problem 1: (20 points)

(a) Determine whether or not each of the following systems are memoryless, causal, stable, linear, and/or time-invariant. Fill each box below with either "Yes" or "No." (input = $x(t)$; output = $y(t)$)

$$\text{System I:} \quad y(t) = \int_{t-5}^{t+1} x(\tau)\cos(10\pi\tau)d\tau$$

$$\text{System II:} \quad y(t) = \frac{d}{dt}\{e^{-t}x(t)\}$$

	System I	System II
Memoryless		
Causal		
Stable		
Linear		
Time-Invariant		

Problem 2: (20 points)

Consider a linear, time-invariant system with impulse response

$$h(t) = 5e^{at-5}u(t-b)$$

(a) For what values of a and b is this system both stable and causal? Why?

(b) What is the step response of this system?

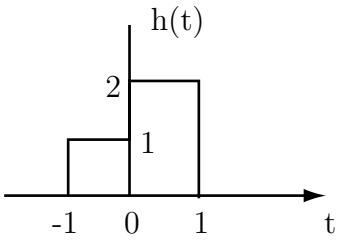
Problem 3: (30 points)

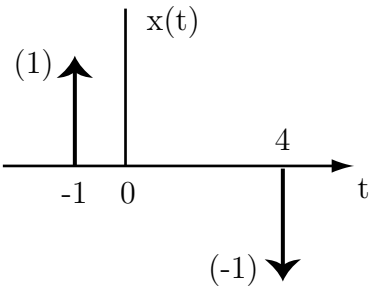
(a) Consider $y(t) = h(t) * x(t)$ where $h(t) = e^{-2(t+1)}u(t+1)$ and $x(t) = 2u(t-2)$.

(i) Give all values of t for which $y(t) = 0$.

(ii) Determine the maximum value of $y(t)$.

(b) Find and accurately sketch $y(t) = h(t) * x(t)$ for





Problem 4: (25 points)

Given the Fourier transform pair

$$e^{-t^2/2} \leftrightarrow \sqrt{2\pi}\ \ e^{-\omega^2/2},$$

draw a line connecting each $x(t)$ below to its Fourier transform $X(j\omega)$.

$\boldsymbol{x(t)}$	$\boldsymbol{X(j\omega)}$
$-te^{-t^2/2}$	$\frac{\sqrt{2\pi}}{2}\ e^{-(\omega-2)^2/2} + \frac{\sqrt{2\pi}}{2}\ e^{-(\omega+2)^2/2}$
$e^{-(t-2)^2/2}$	$\sqrt{2\pi}\int_{-\infty}^{\omega} e^{-\alpha^2/2} d\alpha$
$\cos(2t)e^{-t^2/2}$	$j\sqrt{2\pi}\ \omega e^{-\omega^2/2}$
e^{-2t^2}	$2\pi e^{-\omega^2}$
$e^{-t^2/2} * e^{-t^2/2}$	$\frac{\pi}{\sqrt{2}}\ e^{-2\omega^2}$
	$\sqrt{2\pi}\ e^{-(\omega-2)^2/2}$
	$\sqrt{2\pi}\ e^{-2j\omega} e^{-\omega^2/2}$
	$\frac{\sqrt{2\pi}}{2}\ e^{-\omega^2/8}$