

Name: _____

Section: _____

EE322 Fall 2008 Exam 1: Part 1

Problem		Possible Points	Score
Part 1	1	25	
	2	25	
	3	25	
	4	25	
Part 2	5	10	
	6	20	
Total		130	

- You will have the first 60 minutes of the lab period to take Part 1 of the exam.
- For this portion of the exam, you are allowed to use 1 page, single-side of notes or whatever you want to write on it, and a calculator.
- You **must show your work** to get full credit for problems. Expect to lose points if you don't.
- Label your sketches (axes and functions) carefully. Expect to lose points if you don't.
- Some potentially useful equations:

$$\cos^2 x = \frac{1}{2}(1 + \cos 2x)$$

$$\sin^2 x = \frac{1}{2}(1 - \cos 2x)$$

$$\cos(x + y) = \cos x \cos y - \sin x \sin y$$

$$\text{tri}(t) = \begin{cases} 1 - t, & t \geq 0 \\ 1 + t, & t \leq 0 \\ 0 & \text{otherwise} \end{cases}$$

$$\text{sinc}(t) = \frac{\sin \pi t}{\pi t}$$

- If you finish Part 1 of the exam before it is called for, turn it in and pick up Part 2 (MATLAB).

1. (25 pts) Continuous-time.

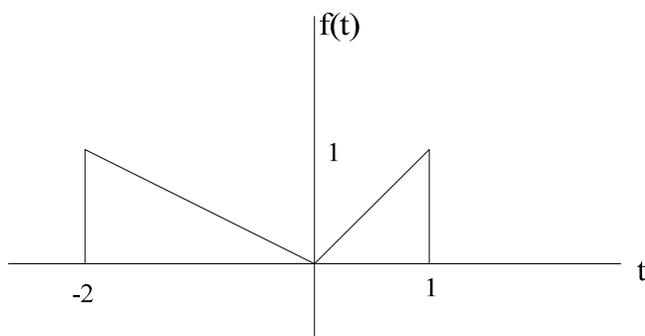
a. Graph $g(t) = -3 \cdot \text{ramp}(2t)[u(t) - u(t - 2)] + \delta(t + 4)$.

b. Determine the odd and even parts of $h(t) = (1 + t^2)\sin(\pi t)$.

c. Determine the fundamental period, if any, of $x(t) = 14\sin(400\pi t) - 6\cos(500\pi t)$

2. (25 pts) Continuous-time.

- a. Given the signal below, graph $-2f\left(-\frac{t}{2}+1\right)$.



- b. Calculate the energy (if an energy signal) or power (if a power signal) associated with the following:

$$y(t) = \text{tri}(2t)$$

$$z(t) = 2\sin(200\pi t).$$

3. (25 pts) Discrete-time.

Suppose you are given the following discrete-time function:

$$x[n] = \text{rect}_3[n-2] + 2\delta[n] - \delta[n+1].$$

a. Sketch $x[n]$.

b. What is the energy in this signal? Is this an energy signal or a power signal? Why?

c. Sketch $y[n] = x[3n]$.

d. Sketch $g[n] = x\left[\frac{n-3}{2}\right]$

4. (25 pts) Discrete-time.

a. Determine the fundamental period of $y[n] = \cos\left(\frac{3\pi n}{2}\right) - 1.5 \sin\left(\frac{2\pi n}{3} + \frac{\pi}{7}\right)$

$$N_o = \underline{\hspace{2cm}}$$

b. Find the even and odd parts of $x[n] = \text{ramp}[n]$.

- d. Write a mathematical expression for the function $y[n]$ shown in the figure below. Your answer should NOT include delta functions.

