Name:

| Problem	Points	Score
1a	10	
1b	10	
1c	10	
1d	10	
2a	10	
2b	10	
2c	10	
2d	10	
3a	10	
3b	10	
Total	100	

Notes:

1. The exam is closed books/closed notes - except for one page of notes.

2. Please show ALL work. Incorrect answers with no supporting explanations or work will be given no partial credit.

3. Please indicate clearly your answer to the problem. If I can't read it (and I am the judge of legibility), it is wrong. If I can't follow your solution (and I get lost easily), it is wrong. All things being equal, neat and legible work will get the higher grade:)

Problem No. 1: Modeling Concepts

(a)   Prove whether the signal $x(t) = te^{-\alpha t}u(t)$ is an energy signal or power signal.

(b)   Is the signal $x(t) = \sin^2 \omega_0 t$ periodic? If so, what is its period? If not, explain.
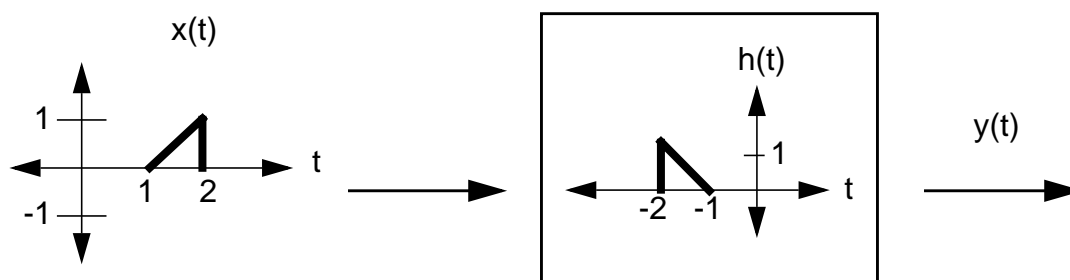
(c) Write the following signal in terms of a weighted sum of a combination of one or all of the following functions: $\delta(t), u(t), r(t)$.
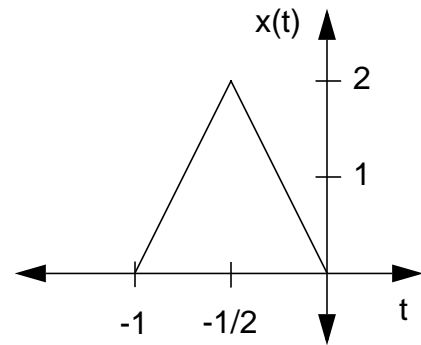
(d) Compute the energy value of the signal in (c).

Problem No. 2: Time-Domain Solutions

Consider the signal and system (completely described by its impulse response):

x(t)

h(t)

y(t)

(a) Compute and plot output, $y(t)$, for the system shown above.

(b)   Without using the answer to part (a), explain whether the system is causal.

(c)   Use your answer to part (a) to support your reasoning given in (b).

(d)   Describe the system using as many system modeling concepts as possible (for example, linearity). Justify your answers.

Problem No. 3: Fourier Series

Given the signal $x(t) = 3\sin(1.5\omega_1 t) + 5\cos(1.75\omega_1 t)$,

(a) Using symmetry arguments, explain which Fourier coefficients of the trigonometric Fourier Series will be zero ({an} and {bn}). Be careful and be precise :)

(b) Compute the Fourier series coefficients.